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ABSTRACT

Graduate schools have been admitting more and more students older than the "traditional" 18- to 24-year-old campus population. These adult learners may come to their programs of study without formal training in library use in general or literature searches in particular. By examining various successful and unsuccessful strategies used by these graduate students to complete literature searches, instructional designers and librarian educators can learn what types of training these learners need most. Several other studies of this type are briefly discussed in a literature review. The 79 student subjects who completed this study (112 began it) were all from urban Wayne State University, all over 24 years of age "with other life roles and responsibilities," and all at varying stages in the instructional technology or library science programs, which made them likely to have interdisciplinary research needs and a preference for the general library collection, rather than specialized collections like law or engineering. Subjects were asked to fill out a search report chart during their search, as well as pre- and post-search questionnaires. Data was gathered on variables in demographics, subject matter knowledge, searching experience, time constraints, and attitudes toward query formulation and search strategies. Among the study's findings were: (1) students generally considered themselves independent explorers of the library who were knowledgeable about database searches, but they actually tended to search much too broadly or haphazardly, particularly without the aid of thesauri; (2) many students did not allow enough time to precoordinate a search strategy; (3) many students claimed to have difficulty locating materials for which they had retrieved citations but rarely asked for interlibrary loan service or other assistance; (4) students were generally satisfied with their results but agreed prior training would have been helpful. Instruction in information literacy is recommended. Samples of the three data collection forms are appended. (Contains 51 references and 13 tables.) (BEW)

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INFORMATION RETRIEVAL TECHNIQUES: THE DIFFERENCES IN COGNITIVE STRATEGIES AND SEARCH BEHAVIORS AMONG GRADUATE STUDENTS IN AN ACADEMIC LIBRARY

by

CHARLOTTE E. SIMON

DISSERTATION

Submitted to the Graduate School

of Wayne State University

Detroit, Michigan

in partial fulfillment of the requirements

for a degree of

DOCTOR OF PHILOSOPHY
1995

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To My Parents
Mildred B. and Markus S. Simon

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The completion of a long and arduous task takes commitment, dedication, and perserverence on the part of any individual. There are some tasks, however, that cannot be accomplished alone. They require the support and commitment of others who are willing to give encouragement, to advise, and to lend a knowledgeable hand when necessary. I would like to acknowledge and thank those other 'helping hands' without whose advice, friendship, encouragement, and support this study could not have been completed.

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CHAPTER I

INTRODUCTION

Overview

Conducting a literature search is an information seeking process, involving a problem solving situation. Anderson (1980) believes that in order for an activity to be considered problem solving, it must be goal directed, involve a sequence of operations, and the operations must have a significant cognitive component.

Gagne (1975) believes that problem solving is an acquired capability and an act of learning. In order to solve any problem successfully, one must be able to consciously or subconsciously apply a previously learned rule to any number of specific instances, and that with problem solving there must be a linkage, for the individual, of certain necessary internal and external conditions. Whereas internal conditions refers to the person's ability to proceed through different mental stages, these stages can be influenced by external conditions and individual differences. External conditions, or events, such as physical stimuli, verbal direction, and instructions, as well as individual differences, such as amount of information stored, ease of recall, and concept distinction, may affect the problem solving process (Gagne, 1975, p. 139). The effect is different for everyone. Education may

be one essential element which Gagne believes influences an individual's ability to solve problems.

Experience

Zook and DiVesta (1989) discuss problem solving by distinguishing between the methods used by the novice as opposed to those of the expert. Whereas novices typically use a goal-directed search strategy, in which the individual works on one goal at a time, experts work forward from given information. Experience and practice appear to be two ways in which an individual moves from novice to expert status.

Mayer (1983) states that there is evidence to suggest that past experience may aid in problem solving. It is his contention that a person's general past experience, as well as experiences just prior to and during the problem solving situation, are important in determining the way in which one responds.

Adult Learners

Pertaining to problem solving and adult learners, Knowles (1973) believes that the roles of experience and age are important factors in the problem solving process. Cognitive changes in adult years are evidence that both programmed and unprogrammed experiences produce changes in the ways in which adults approach and organize their thinking. Knowles theorizes that adult learners have unique characteristics which allow them to develop skills to solve problems independently. It is his belief that whereas

younger students have a subject-centered orientation, adults approach an educational activity with a problem-centered orientation toward learning.

There are other numerous theorists who discuss adult learners and the qualities and differences that they bring to a learning environment. Chickering (Thomas & Chickering, 1984) states that adults and traditional-age students differ greatly in, among other elements, their life experiences, their self-determination, and their need for practical application in the learning environment. Other writers (Apps, 1981; Shekley, 1984) believe that the main difference between adults and younger learners has not as much to do with adults being more unique or independent in their learning and problem solving abilities, but rather as individuals who bring something extra to this learning environment. There are as many distinct differences among adults themselves, such as learning styles, motivation for learning, and developmental tasks, as exist between adults and younger learners. Another quality, according to Brookfield (1986), is that adults, more so than younger learners, have a greater capacity to be critically reflective. This characteristic may be an important aspect in the literature search process.

Cognitive Strategies

Cognition is a set of mental processes which includes thinking, reasoning, understanding, remembering, and problem

solving. Cognitive strategies are selected, organized, and controlled mental processes, and are attuned to certain types of tasks and situations. Bloom and Broder (1950) suggest that the strategies for creative problem solving can be learned. Messick (1984) states that one's cognitive strategies are varied as a function of particular situations, and that strategy formulation and strategy choice are amenable to change through training under varied conditions of learning.

Do the differences in cognitive strategies from one person to another allow for greater success in problem solving? According to Merriam and Caffarella (1991), the learner's ability to locate appropriate and useful resources has often been cited as a key aspect to learning on one's own. Although researchers have a fairly complete list of the types of resources used, they do not have a clear description of how learners locate these resources and how they judge whether or not these resources are useful.

Problem solving is a complicated cognitive process. Allen (1991) believes it is obvious that activities such as looking for and locating information through an information system use cognitive processes. Researchers in the information science field have examined problem solving behaviors of individuals who are using a variety of strategies and search tactics as ways to locate information.

There may be a variety of factors which can have an

effect upon one's ability to successfully retrieve relevant information, whether from a technologically or print based system. Many researchers believe that in order to create better information retrieval systems, it is important to understand users and their use of, and interaction with information systems and technologies, as well as their plans, strategies, expectations for, and evaluations of located information (Nilan, Peek, & Snyder, 1988). Understanding information users also means understanding that these users have differences in cognitive abilities which can ultimately affect their information retrieval results (Allen, 1991, p. 19).

These differences, in training, cognitive strategies, experiences, and problem solving skills, not only between adult and younger learners, but also among the adult learners themselves, should affect the manner in which all learners utilize the resources and technologies of a university, including its libraries' staffs and materials.

Statement of the Problem

Some adult learners, without guidance from search strategy models or academic librarians, with little knowledge of subject matter, or formal instruction and/or experience in the use of search tools and technologies, are able to successfully locate relevant and useful materials.

Others, however, feel frustrated and unsuccessful with the literature search process. This problem, which involves questions concerning both human-information interaction and information processing skills, can be addressed by (1) reviewing current and past research on all types of literature searchers, including their strategies, behaviors, attitudes, and personality traits, and (2) by observing and describing the various literature search behaviors and strategies used by students in an academic library.

Background of the Study

In the United States there has been a major change in the demographics of colleges and universities. Except for a brief period after World War II, when returning soldiers took advantage of the GI Bill of Rights to acquire a college education, schools of higher education have traditionally been attended almost exclusively by students between the ages of 18-24. However, in the last 20 years, educational institutions have again been welcoming adult learners in unprecedented numbers. As much as 20 years ago, recommendations from the Carnegie Foundation for the Advancement of Teaching (1975) included at the top of its list of fifteen suggestions for a college or university's future viability: (1) attract all ages rather than just 18-21 year olds, and (2) provide for part-time rather than only

full-time students.

Graduate schools have also changed dramatically. Once nearly totally the domain of younger learners who moved into these schools immediately upon completion of undergraduate studies, they are now places where adult learners have been returning after many years of experiences with careers, family, and community life. There is greater heterogeneity on college campuses now than ever before. And this trend appears to be growing. According to the U.S. Department of Education (National Center for Education Statistics, 1993), between 1980 and 1992 enrollment in all areas of higher education increased by 20 percent, with the enrollment numbers growing more rapidly for older than for younger students. Whereas the increase for younger students rose only 3 percent from 1980 to 1990, during this same period there was an increase of 34 percent for students over the age of 25. Graduate degrees have also taken a leap. Over this same period of time, there has been an increase by nearly 15% for master's and 20% for doctorate degrees.

For the first time since this country was formed, adults outnumber the youth, the population is better educated, and there is more cultural and ethnic diversity (Merriam and Caffarella, 1991). It has been predicted that by the year 2010, the 'traditional' college student will represent only 53% of the entire student body (Sheridan, 1986). These adult learners are, in many ways, different

from the younger students. They are more self-directed, and their learning becomes more problem-centered (Knowles, 1973). Researchers have shown considerable interest in this change in educational demographics. Howard (1983) surveyed adult enrollment patterns for universities in Canada, and concluded that a change was needed in library use education to accommodate this learner population.

We have also increased our need for information. The activity of literature searching is growing by millions of searches annually (Saracevic, Kantor, Chamis, & Trivison, 1988). Although in most cases it is still a professional activity, in academic libraries students are completing searches independently. Borgman (1984) believes that this new population of searchers is more heterogeneous, and brings a vast array of skills and demands to information retrieval systems. Then too, Borgman believes, there is a fundamental change in the use of computing technology. Access requirements change when information search tools are no longer used only by experts. Most of these new searchers lack both a technological inclination and the motivation to commit to the necessary training it takes to use the systems appropriately. This change in searcher populations has led, since the late 1970's, to cognitive research in information science. These studies have been conducted not only in the design of information systems, but especially in user studies, which look at the information needs, problems, and

behaviors of all types of searchers, and how they interact with print as well as on-line systems (Allen, 1991).

Instructional designers, due in large measure to the writings of Malcolm Knowles and others (Knowles, 1973; Apps, 1981; Long, 1987; Merriam & Caffarella, 1991), are well aware of the differences in learning styles and needs of younger and older students in the academic setting. Sheridan suggested that returning adult learners not only have different needs, but may have serious difficulties in the areas of writing skills and research methods (Sheridan, 1986, p. 186). An understanding by writers on this topic (Dreifuss, 1981; Clayton & Nordstrom, 1987) is that the level of graduate student library and research literacy is low. One example is seen in the research by Charles and Clark (1990), involving observations of 45 CD-ROM users at Texas A&M University. Results revealed that the majority of participants in their study did not understand the basic concepts of searching. Despite the instructional assistance provided in a variety of ways, including personal, onscreen, and printed directions, end users remained unskillful at searching. It was noted that students' frequency of use was not related to their levels of study. And, it might also be stated here, that graduate students, with a strong interest and commitment to their fields of research, made up the majority of participants in their study.

Designing specialized instruction and services to meet

the needs of their learners will continue to pose a major challenge for all universities. Reynolds believes that the extent to which university students make use of all of the resources provided for them in an academic library has not been demonstrated clearly in the literature, yet a large portion of the academic library budget is invested in sophisticated search tools and other services to meet the needs of the populations they serve (Reynolds, 1987). Because students at the graduate level should be expected to demonstrate research skills, these students will need help in understanding not just the search process, or how to use the library's specific resources and technologies, but also in developing skills for locating, interpreting, and integrating relevant and useful materials which will meet their research needs.

Shekley feels that diversity is the distinctive characteristic of adult learners. The greatest challenges that adults bring to an educational environment are their differences in learning styles, interests and motivation for learning, life roles and transitions, prior experiences, learning goals and developmental tasks (Shekley, 1984, p.9). Studying library search strategies and problem solving behaviors of adult graduate students could be one way to lead instructional designers and academic librarians toward a better understanding of this population's research needs. It is possible that it could also lead to devising unique

methods for searching, which would accommodate students' differences. Therefore, the focus of this descriptive study is the population of adult learners who, as graduate students, use their own unique strategies to access academic materials from the vast stores of information and resources available to them.

Definition of Terms

For the purposes of this study, operational terms used in this paper will be defined in the following way:

1. *Searcher*: One who looks for information on any subject by utilizing the resources and/or technologies provided in any location. For the purposes of this study, the focus will be the academic library.
2. *Novice end-user*: Any nonprofessional searcher who uses the library's resources and technologies on an irregular basis to look for information, and uses that information for his/her own needs.
3. *Independent literature search*: The act of looking for information, on any subject, in a library, and doing so without the help of a librarian, professional searcher, other library staff, or a friend or colleague.
4. *Search strategy*: Any organized physical and/or mental plan or method, created by a searcher or novice end-user, in an attempt to access information relevant to

his/her research question.

5. *Search behavior*: All manner of physical and mental exploration carried out by a searcher or novice end-user in an attempt to acquire materials under given circumstances.

6. *Information seeking*: The act of searching (in any manner and /or location) for materials and/or ideas which may be relevant to a specific research question.

7. *Urban university*: An educational institution located in a large metropolitan setting, having (a) a student population with a heterogeneous mix of ages and backgrounds, and (b) the majority of its students living off campus.

8. *Academic library*: Any library located on a college or university campus, which maintains a unique collection of print and non print materials specifically obtained to meet the needs of the students, faculty, and staff of that particular setting.

9. *Adult learner/student(s)*: A heterogeneous mix of individuals who are (1) at least 24 years of age, (2) are currently attending an institution of higher learning, and (3) come to that learning environment with numerous other life roles, responsibilities, and experiences (i.e. employment, family, etc.). For this study, this definition will pertain only to the adult learner/student attending Wayne State University.

Significance of the Study

There were several purposes for conducting this study. First, in terms of Instructional Design/Technology, this research was conducted (a) to look at how and why adult graduate students use all manner and variety of physical and technological means in their attempts to answer research questions which they consider relevant to their educational needs, (b) to investigate any relationships which may exist between the cognitive strategies, attitudes, and search behavior of adult learners at different levels of graduate studies, (c) to find out what attitudes these students have about the academic libraries and the literature search process, and (d) what help instructional designers may be able to provide in the design of unique search strategies. Second, by looking at students' various techniques for completing successful or unsuccessful literature searches, this study could show how the variety of resources and technologies in an academic library are currently being utilized by graduate students.

It is a common practice for some colleges and universities to provide a library skills course for incoming undergraduate students. Frequently, this type of course is a mandatory part of the students' academic load. These institutions believe that by providing courses in bibliographic instruction, new students will develop better 'research skills' if they are familiar with the location of

the library system's materials, and know how to use the available search tools and technologies. Incoming graduate students, however, many of whom have been away from the academic setting for several or more years, and who are now returning as adult learners to a new and unfamiliar type of academic library, may not be required to take a library skills course. Many graduate students have had neither formal nor informal instruction in the use of an academic library's resources and technologies to identify relevant and useful materials for their research needs. And, according to Reynolds' study of master's level graduates at San Jose University, it appears that, generally, faculty consider good information retrieval skills less important than do librarians (Reynolds, 1987, p. 87). For some graduate students, this type of course could be helpful in encouraging development of good library search skills (Kirk and Lynch, 1972; Howard, 1983; Steffen, 1988). Although without this help many graduate students, over the course of their studies, independently develop successful search strategies, many others do not. By examining the various strategies used by graduate students to complete literature searches, one can see the significance of this study for instructional designers and librarian educators. With the information gathered here, both disciplines can better understand what type of instruction might be designed which could meet the variety of needs of a university's learners.

Research Questions

The following questions guided this inquiry into the search strategies and behaviors of graduate students in an academic library setting:

Primary Research Questions

1. How do students' knowledge of search methods and their search behaviors, affect students' attitudes about the literature search process?
2. What relationship can be seen between success with an independent literature search and searcher attitude?
3. What internal variables (cognitive strategies, searcher attitudes) do students who have conducted successful literature searches have in common?
4. What external variables (search experience, search methods, subject matter knowledge) do students who have conducted successful literature searchers have in common?

Secondary Research Questions

In addition to the above research questions, the following questions were also used to guide this study:

1. Are there some influencing factors, other than those encompassed in the primary research questions, involved in a successful literature search?
2. Are there any differences, in terms of the problem solving process, between new graduate students and

doctoral candidates in their abilities to complete a successful literature search?

3. Is there any relationship between literature search strategies and educational level?
4. If a novice end-user is unsuccessful in completing a literature search, to what does s/he attribute the problem?
5. To what extent are graduate students utilizing all available library resources to locate information?

All of the above questions focus on the search behaviors, strategies, attitudes, experiences, and subject matter knowledge of graduate students when they use academic libraries. In an attempt to answer the above questions, this study examined students' literature searching, and asked these students about their methods and understanding of the literature search process. By conducting this type of study, this researcher hopes that the information gained here will add some understanding of how graduate student/novice end-users interact with print and on-line information tools, the technologies currently in place, and all of the other instructional resources available to them, as well as help determine which resources students consider relevant and useful for their research needs.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter discusses various studies completed by researchers who were interested in the topic of literature searches and the different traits of those individuals who perform searches in an academic setting. This review covers past and current research in several areas, including instructional design, graduate students, searcher behaviors and styles, and personality traits of successful searchers.

Library Use and User Studies

According to Krikelas (1983), library use and user studies probably form the largest portion of library research literature. These studies have been approached from a variety of angles by researchers in librarianship. This is an extremely diverse subject area. Included are studies in catalog use, reference service use, and techniques used to search specific databases. Bates (1981), who narrowed her literature review bibliography on user studies to include only searching techniques from a psychological point of view, eliminated (a) searching procedures in internal computer file organization, (b) the reference interview, and (c) techniques used for specific databases. However, she still managed to include over 60

citations of studies and reports just from 1976 through 1980. Since 1980, user studies have continued to be a topic of great interest for library researchers.

Several other important critical literature reviews have been completed on information seeking and retrieving, including on-line searching of databases (Fenichel, 1980a), psychological research in human-computer interaction (Borgman, 1984), information needs and uses (Dervin and Nilan, 1986), search theory and models (Huston, 1989), and cognitive research in information science (Allen, 1991). In recent years, the research in library and information science appears to have shifted its focus more upon human behavior and interaction with information, and less upon systems performance. Even with the large amount of research in information seeking and retrieval techniques, this topic continues to be of considerable interest, and yet remains in its exploratory stages. However, many who write on this topic believe that the key to the future of information systems and search processes appears to be in an increased understanding of human involvement with information (Saracevic, et al., 1988), and that the objective of looking at information use through a cognitive point of view is to be able to understand and explain what the individual behavior and experience is in this complex information seeking process (Kuhlthau, 1988; Allen, 1991).

Instructional Design

The research on this topic has not been done by instructional designers, who appear to have taken little interest in the need for designing instruction and information systems for the library user. Recently, however, researchers in the field of library and information science have become increasingly interested in the theories and practices of instructional designers. A few library use and user studies have looked at literature searchers in terms of the same theories that form the basis of instructional design. Tuckett and Stoffle (1984) discuss learning theory as an approach to designing library instruction. They define the self-reliant library user, and look at good problem solving skills as a critical component to success in searching. They conclude that the principles of learning theory, and the application of instructional design, offer potential for instruction for this type of searcher. Other writers have discussed the idea of combining instructional design methods with library instruction as it applies to teaching librarians how to instruct patrons in literature searches. Sheridan (1986) speaks of the need for academic librarians to understand student differences, and encourages research on adult library users on the college campus. Jakobovits and Nahl-Jakobovits (1987) look at the user's behavior in combination with the cognitive, affective, and psychomotor domains.

They developed a taxonomy of library skills and errors which classifies nine distinct types of user behaviors among the three domains. These authors believe that this method is a way to link library and information science to behavioral and social science.

Allen's (1991) literature review of user studies considered the cognitive domain in relation to information seeking behavior. He believes that by studying users' cognitive processes, and their knowledge of subject matter, search topic, and the information retrieval system being used, researchers can design systems which will provide a searcher with instructional help at various stages during the search process.

Searcher Behavior, Experience, and Personality Traits

Pertaining to search behavior and searcher traits of graduate school students, Bellardo (1985) and Logan and Woelfl (1986) studied students in library school. Bellardo's research looked at personality attributes of on-line searchers, and attempted to correlate search proficiency with various personality traits. She found that not all potential searchers will do well, and personality traits will not distinguish good from poor searchers. Rather, to some degree, differences in success of searching performance may be attributed to a searcher's inclination toward critical thinking, artistic creativity, and analytical skills.

Logan and Woelfl (1986), also looked at individual differences in search behavior among future professional searchers. The results of their study of 12 novice searchers attending the Graduate School of Library and Information Science at Florida State University, suggested a possible relationship between learning style and search behavior. These researchers also suggested that individual differences in search behavior associated with learning style appear early, and may not be altered with experience. This investigation also found little relationship between reasoning ability and search behavior, but they believe that their findings suggest a searcher's cognitive characteristics may have some effect upon his/her search behavior. However, they are quick to point out that statistical relationships do not prove causality.

Both of the above studies looked at future librarians in an attempt to find out what type of librarian would make a good searcher. These students would eventually be conducting searches as a regular part of their jobs. Novice end-users, however, who are defined as those individuals who use the library's materials and tools to conduct searches for themselves, are generally untrained, and would not be searching on a regular basis.

One common question in search literature asks "what are the special skills in searching that are acquired with experience?" Fidel (1984) believes that researchers still

do not know what these skills are. Some researchers believe that successful searching is a matter of going through several stages of constructing and reconstructing the search question, and that experience plays a major role in the search process. However, in reviewing the current research literature on search performance, Bellardo suggested that not only do many practicing searchers not perform this task at an acceptable level, research appears to indicate that novice searchers with very little training do as well as experienced searchers, and that training and experience do not necessarily predict or improve one's search performance (Bellardo, 1985, p. 24).

A study of experienced and novice end-users was conducted by Hsieh-Yee (1993). The objective of this study, which compared 30 novice graduate student searchers from the University of Wisconsin-Madison's Department of Educational Administration to 33 professional searchers, was to look at the effects of search experience and subject knowledge on on-line searches. The study's data regarding the role of subject knowledge showed that no matter what topic was searched, the graduate student novice end-users showed a lack of effort by using the same tactics whether searching in familiar or unfamiliar subject areas. Professional searchers, however, knew how to adjust their searches in unfamiliar subject areas. Experience in searching affected subjects' use of the database thesaurus, off-line term

selection, and reliance upon one's own search language. This study suggested that search experience was an important factor, but only in its relationship to subject matter knowledge.

Fidel (1991) studied searching styles. This researcher observed 47 professional searchers performing a total of 281 searches as part of their jobs. Three characteristics of individual searching styles were identified: (1) the level of interaction during a search, (2) preferences for the type of move, and (3) preference for the type of search key. Fidel concluded that searching is not an "impressive art", there are no laws governing the correct way to search, and style affects behavior in the search process. This study suggests that some search characteristics are inherent in the searcher, while other characteristics are acquired through professional experience (Fidel, 1991, p. 526).

A set of studies on the search behavior of university students was conducted by Guthrie, Britten, and Barker (1991), who looked at the roles of document structure and cognitive strategies with search behavior. They completed two studies which examined the cognitive processes involved in locating specific information within a single document. In each study, subjects were undergraduate volunteers from an educational psychology course. There were a total of 51 subjects with an age range of 20 to 26 years. In the first study, one interest for the researchers was whether there

were differences in the way in which individuals search documents. They believed that there may be several strategies that result in an effective search, and other strategies which are not as effective. They reasoned that there were a variety of searcher types, and that students who use an efficient strategy would require less time to locate and answer questions than searchers who maintained inefficient strategies. One conclusion from this study was that a student may be aware that s/he is using an inefficient strategy, but may prefer to continue to use the strategy because it is comfortable or convenient.

Another study of search behavior and searcher traits was conducted by Kuhlthau (1988). She completed a longitudinal case study which followed students from the 12th grade through four years of undergraduate studies, in order to better understand their individual perceptions of the information search process. This study was also used to determine whether individuals have habitual approaches for searches which are consistent over time, whether there are common experiences generic to the search process, or whether individuals at that age have unique processes which develop over time. Kuhlthau found that with experience and age, students tend to change their search behaviors. She believes that the user's perspective, as opposed to that of the librarian's, or others within the information system, is an important focal point in studying information seeking

behavior. This is because of (1) the user's lack of knowledge of the subject matter and the various information systems which are being used to perform searches, and (2) the user's perceptions, which are what directs his/her actions and choices during a search process (Kuhlthau, 1988, p. 158). Studies such as this have implications for the design of information systems, library school education, and user education.

Saracevic, et al. (1988) conducted an extensive, long term study which is making a great contribution to information search literature. This large project, which continued from 1981 to 1987, was completed in three phases. Researchers were interested in observing and conducting experiments on searchers and searches, because they felt that although there is nothing wrong with common sense, the practice would be better off if there were agreed upon search principles, which could be taught on the basis of scientific evidence. By completing this research, they believed that the information gained would contribute to the knowledge base of search theory, and confirm the elements involved in information seeking and retrieving, especially in relation to the cognitive context, decisions, and interactions involved in a search.

One important objective of the Saracevic study was to look at cognitive traits and decision-making of searchers (Saracevic, et al., p. 162). This study involved 40

professionals who required information in their own fields. It was conducted under a controlled research environment, and the researchers did not allow those conducting the searches to have access to, or in any way interview those individuals who would ultimately be using the information. All searching was performed under the same conditions, using the same tools, equipment, and protocols. These researchers believed that this type of restriction is commonplace in real-life situations. They also believed that the degree of internal knowledge of a searcher, about the problem to be researched, has potential to greatly influence performance. One of the most significant findings obtained from Saracevic's study includes the odds of relevance or non-relevance of an item when compared to the number of times the same item was retrieved. The greater the amount of times an item was retrieved meant the greater the relevance of that particular item. There was a strong parallel between user satisfaction with the search and item relevance or utility (Saracevic, et al., 1987, p.x).

Novice End-Users

Several writers have conducted studies on search techniques from the end-user's experience, looking at how this type of individual thinks about and carries out an independent search for relevant materials. Dalrymple and Zweizig (1992) conducted a study on the relationship between search experience and affective measure with forty students.

They stated that it is difficult to describe behaviors, attitudes, and feelings of the searchers. Their conclusion was that at least two dimensions, benefits and frustrations, are related to users' affective response in retrieving information, and that there appears to be a relationship between these dimensions and searching behavior.

Jacobson and Fusani (1992) believe that trends in information searching indicate the need for an increased focus on novice end-users. Their study examined the prediction of search success of end-users who had varying levels of expertise in computer systems and the subject areas being searched. The subjects, 59 undergraduate juniors and seniors attending an urban university, searched the NEXIS system, which contained over 700 full text files. These students were trained in searching methods. The aim of their searches was to retrieve and evaluate documents. A maximum of 10 items would be considered by each searcher. When too many items were retrieved, students were instructed to refine the search and attempt further searches until they found a set that showed focus and usefulness. Many students retrieved nothing, while others retrieved many more than the required ten on the first search. The overall average was nine documents. Search results indicated that success of document retrieval based on relevance and usefulness for the overall study were considered moderate. Conclusions formed by Jacobson and Fusani suggest that computer, system, and

subject area knowledge are three variables that, when interconnected, contribute to search success.

Fenichel (1980b) examined the relationship between searching behavior and searcher background. In her study, five groups of individuals performed pre-selected searches using DIALOG, which is an ERIC subset. The groups ranged from novices to very experienced searchers, with and without ERIC experience. Results indicated that, compared to the experienced searchers, the novices performed quite well. Although they were slower than those subjects with experience, and scored lower on most outcome measures, the differences from experienced to novice searchers was not very large. Only slight evidence supported Fenichel's hypothesis that database searching experience leads to greater searching success.

Parrish (1989) analyzed searching behavior of a wide range of graduate students at Bowling Green State University. The purpose of her study of faculty and students was to gather a better understanding of the research needs and the research environment in which this type of student functions. Upon examination of the data, Parrish found that although most of the students studied had previous library research experience prior to the start of their graduate programs, they continued to experience problems with the process. Time management and access to materials were also a problem. However, Parrish believed

that the key factor in successful research was the faculty, who seem to be unaware or fail to avail themselves of the services that their academic library provided for them and their students.

The Getty Online Searching Project, developed by Siegfried, Bates, and Wilde (1993), was a two year project, running from 1989-1991. It was designed to analyze the end-user searching behavior of advanced humanities scholars at the Getty Center for the History of Art and the Humanities in Santa Monica, California, and was prompted by an understanding that end-users are increasingly performing their own searches. These scholars not only knew their own subject matter quite well, but were provided with intensive one-day training and unlimited 24 hour free access to on-line databases. Results of this study indicated that most of the participants did fairly well after the one-day training, but even scholars with expertise in their search subject, with some intensive training in search techniques, and with initially low error rates, had some problems and did not take full advantage of either their training or the unlimited access to information. Of the 27 participants of this study, only five (18%) ultimately took enough advantage of the opportunity to make their training worthwhile. This study indicated that, although limited search training was not enough to develop novice end-users into expert searchers, it does appear to be very helpful. Their search

techniques were more sophisticated, they continued to learn techniques throughout their search experiences, and error rates remained low.

Sullivan (1985) studied doctoral students' searching behavior. The students were divided between those who had received training in searching and then performed their own searches for free, and those who had searches performed for them by a skilled librarian. The students who received training learned on either a menu or a native command system. Both groups were equally satisfied with their search results. However, although the students who performed their own searches obtained fewer hits, the hits were higher in relevance than those of students whose searches were performed by the librarians. The researcher stated that it actually made no difference in the type of system on which one learned to search, but that those students who did the work themselves were more motivated and willing to follow up on consulting the references that they identified. Sullivan concluded that end-users can learn to do their own literature searches effectively without the help of intermediaries, and that those who take the time to search place a greater value on the items they retrieved.

Searching by novice end-users was also studied by Hansen (1986). The primary interest in this study was the strategies and cognitive skills rather than mastery of the system by novice end-users. Fourteen graduate students

majoring in mass communications conducted independent searches by either electronic/manual or manual/electronic methods. Statistical outcomes, perhaps because of the small sample size, indicated that it did not appear to matter which procedure provided the best search results. In terms of preciseness, the manual/electronic search was better. However, for total relevant items, an electronic/manual search appeared to be superior. This research pointed to (1) the realization that searching via a combination of both print and technology, regardless of order, is necessary in order to obtain the most complete results, and (2) that using subjects in a real rather than an artificially controlled setting more accurately reflects the actual experiences of novice end-users who use the same tactics.

All of the studies in this literature review looked at searchers, search behaviors, and experience with the search process. They focused on attempts to determine which variable, or set of variables, most contributed to the searchers' abilities to use the academic libraries' technologies in order to successfully complete a literature search. The researchers' methodologies were to control and limit the search environment, and look at the entire process in terms of human-computer interaction. These studies used professional searchers, graduate students, adult students, and novice end-users. Researchers looked at personality traits, search experience, personal backgrounds, computer

system expertise, and affective measures. However, unlike the study to be completed here, no researcher looked at graduate student/ novice end-users, who also sought out any combination of other available libraries and/or resources in order to complete their literature searches.

Conclusions drawn from the studies in this literature review indicate that there appears to be no definitive psychological or cognitive traits held by searchers or novice end-users which will significantly lead to successful search results. All of the studies were experiments conducted under controlled conditions. None were descriptive in nature. They did not address the problem studied here, which was to look at the way in which urban university graduate students, many of whom use an academic library's tools, technologies, and resources on an irregular basis, and with little training in, or knowledge of search methods, frequently conduct their literature searches.

This study of graduate students, conducted at Wayne State University (1) took into account, and did not limit searchers to any specific methods or resources used, (2) did not limit these subjects to print or non-print technology, and (3) allowed the subjects to make their own determinations about what, why, and how retrieved items were relevant to their research question. It also looked at students' understanding of the concepts of the research question, the problem statement, and the process of search

term formulation. This study drew upon what had been accomplished by past researchers, including studies by Hansen (1986), Kuhlthau (1988), Saracevic et. al. (1988), Nilan, Peek, and Snyder (1991), and Brown (1991), in that it looked at the concepts of search behaviors and strategies, and item relevancy/utility determination. It is also related to many of the other studies discussed in this literature review because it, too, studied variables in the search process, and drew some conclusions about novice end-users' searching strategies and behaviors, and their attitudes about the search process.

All individuals develop unique cognitive strategies. Some strategies have a positive effect in helping searchers to retrieve and identify appropriate information. The possibility that the variety of search strategies and methods used by novice end-users to obtain relevant items can be identified as being as good as those used by expert system searchers, is an area which appears to remain unexplored in search literature. This is also an area of study that can add to the knowledge base in the disciplines of both Instructional Design/Technology and Library and Information Science. It is hoped that this study will build upon the current literature on this topic.

CHAPTER III

METHODOLOGY AND PROCEDURES

This is a descriptive study of the current status of academic library use by a cross section of graduate students. It is believed by this researcher that the research methods discussed herein were an appropriate method in which to learn more about both (1) students' research needs, and (2) the variety of search behaviors used by student/novice end-users in an information-rich environment.

The purpose of this investigation was to identify the variety of strategies used by graduate students having varying levels of expertise in their own subject areas, in search methods, and with search tools and technologies, to locate and evaluate the relevancy of obtained items. A secondary objective was to look at students' attitudes toward the search process.

Population and Sample

The target population for this study was adult students who were attending graduate schools at major public or private institutions located in urban settings across the United States, and who would be using academic libraries to search for information for either assigned class research papers, or other research needs, such as a master's thesis,

essay or project, or dissertation literature review. Examples of these major institutions, which are referred to as the "Urban Thirteen" because of their size, multicultural student population, and location within a large urban setting, include such institutions as City College of New York, Columbia University, Howard University, Temple University, the University of Illinois - Chicago, and Wayne State University.

Wayne State University, which maintains a uniquely large percentage of adult, and multicultural student population, is located in a major metropolitan setting. Total enrollment for WSU, as of the Winter, 1994 semester, was 31,552. Of this number, 10,053 were enrolled in the University's various graduate programs. The mean age of all WSU students was 28.6 years, with 88% of the population coming to the campus from the tri-county area (WSU, 1994).

Wayne State University appeared to have the elements as described in the target population being studied. Therefore, the representative population was graduate students enrolled in WSU's various graduate programs.

From this population, the researcher located a purposefully selected sample which would consist of adult students who were at different stages of their graduate studies at Wayne State University, from new enrollees in a master's program to doctoral candidates. To determine appropriate proportional sample size and characteristics,

enrollment statistics from the University's graduate school were used.

Because this study was limited to students who are potential users of the materials and resources which could be found in WSU's Purdy-Kresge Library, and excluded the specialty collections located only in WSU's science, law, and medical school libraries, the sample selected for this study excluded those students enrolled in the schools of engineering, law, and medicine, as those students would most likely restrict their research only to those special disciplines, and use only the university's specialized libraries. However, the students selected for this study were not limited in their searches to only what actually physically existed in the Purdy-Kresge Library, and could use whatever methods, materials, and resources they wished, whether in or out of that library. The researcher believed that this would lead to a better understanding of how the general graduate population of an urban university searched for materials.

The researcher further believed that an appropriate sample of the above stated population could be drawn from the Instructional Technology and the Library and Information Science Programs at WSU. This was determined because both programs have enrolled students who (1) come from a broad cross section of disciplines, including science, education and business, (2) were at different levels and stages of

their educations, (3) would be at varying ages and levels in their educational careers, and (4) maintain various levels of expertise in their subject areas, the literature search process, in search tools and technologies, and with the vast array of resources provided by an academic library.

Subjects Selected for the Study

1. This study eliminated WSU students majoring in law, science, engineering, and medicine, since students studying in these disciplines would be the most unlikely to use the university's general collection for literature searches.
2. Subjects who participated in this study were enrolled in one of six selected courses - two in the Library and Information Science Program, two in the Instructional Technology Program, one cross listed course required by students in either Library and Information Science or Elementary Education, and one course in the College of Education's Adult and Continuing Education Program.
3. All subjects were over the age of 24, which, for the purposes of this study, was the minimum age of an adult.

Course Selection

Students from six different on-campus courses were selected to participate in this study. Five of the six

courses contained students who were registered in one of three selected Library and Information Science courses or one of two Instructional Technology courses. A sixth course, taught in the College of Education, involved a broader cross section of individuals who themselves teach adult learners who are at a variety of levels. All courses involved in this study were taught during the Spring, Summer, and Fall semesters of 1994 and are described here:

(1) Library Science 601 - Introduction to the Information Profession. For all new LIS students. Most of these students were beginning their master's level LIS program, and may or may not have had prior experience in research.

(2) Library Science 799 - Master's Essay Direction and Research Methods. This course examines the role of research in the information profession. Students in this course learn to analyze research reports and are required to develop their own research proposal. These students had gone through the LIS program, and were completing their coursework for a master's degree. It was expected that these students would be the most experienced in the use of appropriate search tools for identifying and locating items for a research paper, and would have the most positive attitude toward using the resources and information located in an academic library.

(3) LS 651/ELE 722 Analysis of Literature for Younger Children. This course examines literature and authors, and

analyzes the literary and extraliterary factors that affect young children. All students were at the master's level, either in the LIS program, or Elementary Education majors from the College of Education.

(4) Instructional Technology 722 - Applications For New Technologies. The focus of this course was on the planning, design, development and implementation of physical space and technology for direct use in training and educational programs. The students in this class were at either the master's or doctoral level in the Instructional Technology Program, and were at varying levels toward completion of their degrees. Backgrounds were very different for most of the students, ranging from medicine to business. Students in this class were required to write a research paper.

(5) Instructional Technology 810 - Trends and Issues in Instructional Technology. This course is offered only to Instructional Technology students at the Ph.D./Ed.D. level. Although admission to the doctoral program was required in order to register for this course, some Specialist level students were enrolled in the course by special permission of their advisors. The doctoral students were at all levels in their studies toward their Ph.D. or Ed.D. degrees. For the students in this class, the researcher's expectation was that all of the students had completed at least one research paper during the course of their studies, and would be somewhat familiar with the concepts of literature searching

and item relevancy. Many of the students in this class were working on smaller, frequent research projects instead of one large specified research paper.

(6) ACE 711 - Adult Learning. This master's level course is part of the College of Education's Adult and Continuing Education Program. Students who were taking this course were in a master's program, and were required, as part of this course to review research in adult learning. Several research papers were assigned throughout the semester.

Variables

The following 6 variables were used to discuss and compare participants' literature searches:

1. Educational Level

All levels from new graduate school enrollees to degree candidates, and from master's level to doctoral candidates.

2. Literature Search Experience

Based upon students' self reported knowledge and use of tools and search methods and available resources.

3. Assessment of Search Strategies

(a) Student use of library tools, technologies, resources

(b) Student knowledge of the literature search process

4. Assessment of Search Behavior

Student report of steps taken to complete the literature search

5. Assessment of Search Success

(a) Personal assessment continuum from successful to unsuccessful

(b) Personal satisfaction with the results of the search

(c) Personal determination of amount of relevant items actually located

(d) Student report on time taken to complete the search

6. Assessment of Attitudes

(a) Attitudes about the literature search process

(b) Student reported difficulty of the search procedure

Research Design

This was a descriptive study. There are several reasons why this research method was considered appropriate to use for this study:

1. The study was evaluative in nature. This research was looking at all search strategies, behaviors, and experiences of a cross section of graduate students without weighing the importance of any single variable, such as age, experience, or educational level prior to the study.

2. There was no control group.

3. This was a nominal study, and would not provide for a treatment effect, but only to gather information about a specific population and provide suggestions.

4. This study provided a method for looking at adult

graduate students in the university as a single population.

5. This is a practical way of looking at the manner in which the resources, tools, and technologies of academic libraries are currently being utilized by a cross section of a university's graduate students who use a general academic library for literature searches.

Research Procedure

The study proceeded in the following manner:

1. It was conducted in three parts: (a) **Presearch Questionnaire**, (b) **Search Report Chart** for students to use while performing their searches (task analysis), and (c) **Postsearch Questionnaire**.

2. Because there was a need to design all three search questionnaires, they were validated via a pilot study.

3. Both the pilot and actual studies were conducted using Wayne State University graduate students in the Library and Information Science Program, Instructional Technology Program, and in General Education.

4. The study was completed on campus during the Spring, Summer, and Fall semesters of 1994.

5. The study was conducted using students in a variety of courses. These students were offered options regarding the type of search to be done (preassigned class research paper, literature review for their master's essays, or dissertation

literature review).

6. After explaining the study and procedures to be followed, students were asked to independently complete the first (Presearch) questionnaire during their class period. Upon completion of this first (Presearch) questionnaire, participants were given the second (Search Report Chart) questionnaire, and allowed several weeks in which to do their literature searches. They were instructed to use this Search Report Chart each time they looked up information on their topics. The researcher met with the participants again in the classroom setting, at which time they returned the Search Report Chart and completed the third (Postsearch) questionnaire as the final part of the study.

Instrumentation

The instruments developed for this study (copies can be found in the Appendix section of this document) were Presearch, Search Report Chart, and Postsearch questionnaires pertaining to students' library search experience, strategies, behaviors, and attitudes about the literature search process. These instruments were designed for self reporting, and were developed by the researcher in order to meet the aims of the research questions. They included the following information:

A. Presearch Questionnaire

Prior to performing the search, the following data was collected on each participant:

1. Demographic Information

These questions asked the participant about age, gender, undergraduate experience and current graduate education program and status, whether students were formally introduced to an academic library through any type of course, and specific reasons for needing this literature search.

2. Subject Matter Knowledge

Questions in this section asked about each student's degree of knowledge of the subject matter and specific topic on which the participant would be searching, and personal ideas about the likelihood of the information being found in the Purdy-Kresge Library.

3. Search Experiences

Questions asked about prior searching, including how the student learned to use the library's resources, dependent and independent search successes & failures, frequency and reasons for each student's library use, and with what databases, tools (thesauruses, etc) each was familiar.

4. Search Strategies

Participants were asked about their understanding of the library's resources and their own search plans, including their planned use of alternative resources, and past search

succussful and unsuccessful literature search attempts.

6. Time Elements

Questions about time included students' anticipation of the search process and which step in the process each participant thought would take up most of his/her time.

7. Formulating the Search Question

Each participant was to provide, if known, the written title and/or research question to be used for the search. This question, which was to have been independently formulated prior to the search process, gave each participant the opportunity to discuss the underlying problem and intent of his/her research, and to list some key words or search terms. Each research question was to be appropriate to that student's own area of study, whether for coursework, thesis, or dissertation. The researcher had no involvement in the provision of topics, questions, terms, etc. If the search question was unknown, this section could be left blank.

B. Search Report Chart

During the search experience, each student was responsible for recording the moves that were made (task analysis). This instrument was in the form of a Search Report Chart which was filled in by the participants as each of their search decisions was made. Headings on the chart included: search tool, search term used for that tool, number of items retrieved, number of relevant items, how relevancy was determined, and the amount of time spent in

the search process.

C. Postsearch Questionnaire

Upon completion of the search experience, all of the participants were asked to return their Search Report Charts. At that time, students were asked to complete a Postsearch questionnaire. The questionnaire inquired about information in the following categories:

1. The Search Process

These questions were about the variety of steps that were taken to begin and proceed through each student's individual search, what resources (formal/informal, databases, print) were used, and their general satisfaction with the results.

2. Search Strategies

This section asked about the students' use of resources, kinds of decisions made when attempting to identify a sufficient amount of items, and the plan that ultimately brought them to identify what they needed to proceed.

3. Locating Materials

After the item identification process, students were to locate the actual materials they believed to be relevant. Questions in this section concerned methods students used for choosing to accept or not accept the information (what amount of any document, i.e. citation, abstract, etc. was read before determination of its relevance/non relevance) and how students determined relevance (criteria used: degree of value to searcher and the search question), percent of

originally identified items actually located, and why these were chosen as appropriate.

4. Time Elements

This section inquired about the time the search actually took at different points in the search process, and students' perceptions about what took up most of the search time.

5. Attitudes

Questions in this section asked participants about their perceptions of the entire search process and the study, including searching difficulties, personal judgements of the success or failure of their searches, whether or not they felt that the experience was worthwhile, and if prior training had helped.

6. Formulation of the Search Question

As in the Presearch questionnaire, the last section provided each participant with an opportunity to state his/her research question and/or topic, key words/search terms used during the search process, and what each student thought was the underlying research problem.

Data Analysis

Analysis of data was completed in the following manner:

1. The participants' literature search strategies were divided into categories and then viewed in relationship to

students' levels of education, subject matter and topic knowledge, past experiences with library searches, types of resources used, time taken to complete the search, and with students' personal judgements of their search successes.

2. Determination of search success was based upon: the postsearch questionnaire, the searcher/end-user's personal judgement of his/her success with the search, and the searcher/end-user's personal judgement of his/her satisfaction about the amount and relevancy of the documents located for the research question s/he was attempting to answer.

3. A set of questions was developed which were related to students' attitudes about the search process. The participants rated the value of their involvement in the project and whether or not, if they'd had prior training, it was helpful for this project. This was then compared to their perceived relevancy of the obtained items, and experiences acquired, the time spent in the search process, feelings of success with their searches, and the difficulty of the process. This information was compared to reported past search experiences, knowledge of search methods, time spent to complete this search, demographics and personal judgement of search success.

4. Sections of the Presearch and Postsearch questionnaires were compared to see if there were changes or improvements in students' understanding of the search process, success,

and changes in predetermined versus actual time elements.

5. The research question and related information (i.e search terms, problem statement) was compared as students stated them on their Presearch questionnaire with the same information stated by those same students on their Postsearch questionnaires. This comparison was made to see whether students understood if their located items had provided some resolution to the problem which motivated the search. By making this comparison, it could be determined (1) whether students changed their search questions to fit the materials located during the search process, (2) whether students merely broadened or narrowed the search terms and the focus of the original topic, but kept the original intent of the research question, or (3) whether students who originally had no research question or problem statement on the Presearch questionnaire were able to understand these concepts and develop satisfactory ones by the end of the search process.

CHAPTER IV

RESULTS OF THE STUDY

This chapter will discuss the contents of the study, including the participants, the research questions being answered, the elements and materials involved, data analysis with results of the study, and a summary of the findings.

Discussion of the Study

The purpose of this study was to look at the ways in which adult graduate students, as novice end-users of academic literature, use a variety of cognitive strategies and search behaviors when conducting literature searches for course assigned research papers, or literature reviews for a master's essay, thesis or dissertation. This study was based upon a review of literature on this topic as well as nine primary and secondary research questions. It was completed at Wayne State University during the Spring, Summer, and Fall, 1994 semesters.

Wayne State is an urban university having a population whose average age is 28.6 years, and 88% of whose students reside off campus, in surrounding communities of the tri-county area.

Participants

Pilot Study

Because questionnaires were created solely for the purpose of this study, a pilot study was used for reasons of questionnaire reliability and validity. The results of the pilot study, which consisted of 28 graduate students enrolled in a graduate level course in Educational Psychology taught in Wayne State University's College of Education, and completed during the Winter, 1994 semester, indicated that the instrumentation required refinement, but that the questions which were asked were valid to the primary and secondary research questions.

Sample Size

75 subjects were needed to complete this study, as this was determined to be approximately 1% of Wayne State University's graduate student population who would be the most likely users of a general rather than specific (i.e. law, medicine, science) academic library for literature searching. The total combined enrollment for all of WSU's graduate schools for Winter, 1994 was 10,053 (WSU, 1994). By eliminating students enrolled in graduate programs of Law, Engineering, Medicine, Nursing, Science, and Lifelong Learning (off campus program), who would be the most unlikely students to use the Purdy-Kresge Library, it was determined that approximately 7,500 graduate students would be likely subjects for this study.

Sample Selection

All volunteer participants were enrolled in one of six classes during the Spring, Summer, or Fall, 1994 semesters. These classes were chosen from the Library and Information Science Program, the Instructional Technology Program, and the CEAL (Center for Excellence in Adult Learning) Project in the College of Education's Adult and Continuing Education Program.

Participant Characteristics

All of the eligible participants were determined to be adult learners according to the definition stated in Chapter I: a heterogeneous mix of individuals who were at least 24 years of age, attended classes on the Wayne State University campus but mainly resided in the tri-county area, and came to the university environment with other life roles and responsibilities.

For the purposes of this study, a new graduate student was defined as any student who was at the beginning of a master's, specialist, or doctoral level program, having taken up to 11 hours of credit (generally 4 classes or less) prior to the semester in which the study took place. Of the total of 112 students participating in this study, students fit into five different levels of study from new enrollees to degree candidates.

Questionnaires

This study used a set of three questionnaires. The entire set of Presearch, Search, and Postsearch questionnaires can be found in the Appendix section of this document. In order for a student participant to have completed the study, s/he was to have completed all three questionnaires. However, some students did not complete all three questionnaires. But because this was a descriptive study, with no control group or testing involving any before-and-after design, all 112 Presearch questionnaires were incorporated into the results of the study for the purpose of providing a discussion of subject matter.

Demographics

The following demographical information was gathered on the student participants:

(1) Age range: Subjects' ages ranged from 24 to 64, with a mean age of 38.7 years.

(2) Gender: There were 91 female and 21 male participants. This was not an intentional selection. The great difference in numbers has more to do with the programs and courses selected for study than any other reason. The programs chosen for this study generally tend to attract a greater number of women than men.

(3) Undergraduate degrees: 32 of the 112 subjects completed their undergraduate degrees at WSU. Of all 112 study participants, only 30 stated that they had been introduced

to an academic library via some type of either formal or informal search skills training prior to their involvement in this study. This introduction included tours, seminars, handbooks, or courses. Only 5 of the 30 subjects stated that they had obtained their undergraduate degrees from WSU.

(4) Program Status: Subjects were about evenly divided between the College of Education and the Library and Information Science Program: 53 students from the College of Education and 59 from the Library and Information Science Program. Among those students who were enrolled in a program in the College of Education, 30 were Instructional Technology students and the other 23 were enrolled in other programs including Center for Excellence in Adult Learning (CEAL Project) and Elementary Education.

(5) Educational Status: The degree status and educational levels of all participants within their respective programs can be found on Table 1.

(6) Time since obtaining an undergraduate degree: In order to determine that there was a broad range of all participants with various levels of familiarity to the 'old' and 'new' types of academic library setups, a question on the Presearch Questionnaire asked students when they had obtained their undergraduate degrees. Table 2 provides a breakdown of this information.

Table 1

Distribution of Study Participants by
Length of Time in Their Programs

(N=112)

Time in Program	Number	%
New Student to Program	38	33.9%
12-20 hours completed	18	16.1%
21+ hours completed	33	29.5%
Working on MA Thesis	20	17.9%
Doctoral Candidate	3	2.7%
Total	112	100.0%

Degree Levels: MA/MS = 85 Specialist = 9 ED/PhD = 18

Table 2

Distribution of Study Participants by Length of Time
Since Completion of Undergraduate Degree

(N=112)

Length of Time	Number	%
In the last year	7	6.3%
2 - 5 years ago	30	26.8%
6 - 10 years ago	17	15.2%
10 or more years	58	51.8%
Total	112	100.0%

(7) Reasons for the literature search: 91 of the students who agreed to participate in this study chose to complete a literature search for a course required research paper. 20 students chose to complete a literature search for their master's essay. One of the participants involved, who initially chose to complete a dissertation literature review, later changed his/her reason for the search to a course related research paper.

(8) Size of the research papers: The size of the course assigned research papers varied in length from 3-5 pages to an undetermined length. Of the choices provided on the questionnaire, the largest group, 62.5%, stated that they planned to complete their searches for a 6-10 page paper. 37.5% involved all other choices. Note, however, that this was just an estimation on the part of the student, and not a report of the end result.

Definitions

Five important terms were used in the nine primary and secondary research questions. These terms will be defined and measured as follows:

(1) Attitudes: This term will be interpreted here as *bias* or *opinion*. All novice end-users have a bias toward, or opinion about the literature search process. For the purposes of interpreting this study, attitudes will be

measured by looking at students' responses on questions pertaining to (a) satisfaction, (b) perceived difficulty with the search process, (c) the time taken up by the entire search process, (d) personal comments about the search process, and (e) perceived helpfulness of prior search training.

(2) Success: For the purposes of this study, this word has been expressed in terms of *achievement*, and was measured by looking at participant answers (a) on a continuum from completely unsuccessful to completely successful, (b) percent of identified citations actually located, (c) time involved in the search process, (d) success of past literature searches, and (e) a comparison between the formulated search question prior to and following the literature search. It is to be noted here that success is measured on a personal as well as on an observable basis.

(3) Search Methods or Strategies: This refers to the participants' search *plans*. Students' plans, as stated prior to their searches, are often different from the actual procedure that takes place during the literature search.

(4) Search behavior: This refers to the actual *procedure* or *steps* taken to complete the search, as opposed to the conceptual search plan (strategy) that students stated on the Presearch questionnaire. As defined in Chapter I of this document, this is all manner of physical and/or mental exploration carried out in an attempt to acquire materials

under given circumstances.

(5) Independent/Dependent Search: A participant completed an *independent* search if no one else was involved during the search process. If, however, anyone else was involved, either by searching with or for the participant, it was considered a *dependent* search. Each participant stated what type of search was conducted on his/her Postsearch questionnaire.

Participant Personality Types

All participants in this study appeared to fit into one of three distinct personality types:

(1) Dependent searchers were those who got help, either at the beginning of the search or at some other time during the literature search process. 'Help' meant either library staff, friend, classmate, or colleague. 22 (19.6%) study participants stated that they obtained help when searching.

(2) Researchers were those individuals who appeared to approach their searches methodically by having first done some organized preliminary work. These preliminaries took any of several forms, including looking up the topic in a subject encyclopedia, searching with the use of a class reference list, using a database tutorial, or using some other related source in order to develop keywords or search terminology. 16 (14.3%) students fit into this category.

(3) Autonomous searchers were those individuals who approached their searches without (1) seeming to make much prior preparation or planning, and/or (2) asking for help prior to or during the search process. A common approach for this personality type was to just look up materials without apparent use of preliminary steps. This group made up 74 (66.1%) of all 112 participants in this study.

Research Results

Each of the nine primary and secondary research questions were examined in a variety of ways, and the following is a discussion of these questions, the variables involved, and the results:

Primary Research Questions

1 **How do students' knowledge of search methods, and their search behaviors, affect students' attitudes about the literature search process?**

The three variables considered for this question were (a) knowledge of search methods, (b) search behaviors, and (c) searcher attitudes. *Knowledge of search methods* was based upon whether or not participants were introduced to the library and its resources via some formal or informal means, such as a search skills course, seminar, handbook,

etc. prior to this study, particularly prior to their enrollment in graduate school. *Search behavior* was based upon what steps students stated that they actually took to identify and locate relevant materials for their research papers. Students' *Attitudes* were measured by looking at (1) the likelihood of materials being found at WSU's Purdy-Kresge Library, (2) the level of satisfaction that they had with the amount of relevant citations they mananged to identify, and (3) their beliefs about their search skills.

When comparing knowledge of search methods with students' attitudes, an Analysis of Variance was used. Although not significant at the .05 level, this test did indicate that there was some difference between subjects who first learned to use an academic library with the aid of instruction by library staff or some other source, and those who learned by independent exploration, in their beliefs that the materials they sought for this research paper would be located at the Purdy-Kresge Library.

Table 3
How Students First Learned to Use an Academic Library
(N=112)

	#	%	Likelihood Mean
Explored on my own	66	59.6%	3.6
Help from Lib Staff	23	20.7%	4.0
Friend/writ'n matr'l/ seminar/class/other	23	20.7%	4.1
Total	112	100.0%	

An Analysis of Variance was also used when looking at students' search behaviors in comparison with their attitudes with regard to the level of satisfaction with the amount of identified citations. Results indicated that on a scale of 1 to 4, with 1 being *'completely satisfied'* and 4 being *'completely dissatisfied'*, a mean of 3.4 was obtained for those students who attempted to broaden their search questions or terminology. However, the greatest level of satisfaction, with a mean of 1.6, was obtained for students who attempted to narrow either their research questions or their terminology (search terms).

2. **What relationship can be seen between success with an independent literature search and searcher attitude?**

For this question, *independence* meant that the individual proceeded through his/her search alone, while *dependence* meant that the search process was completed with help from another individual, whether it was library staff, a friend, classmate, or colleague. *Success* was measured as percent of identified citations that were actually located, and *attitude* as the level of difficulty participants believed that they'd had with the search process.

This question measured (1) independence against attitude and (2) attitude against success. When comparing independence in search behavior against attitudes, 1/3

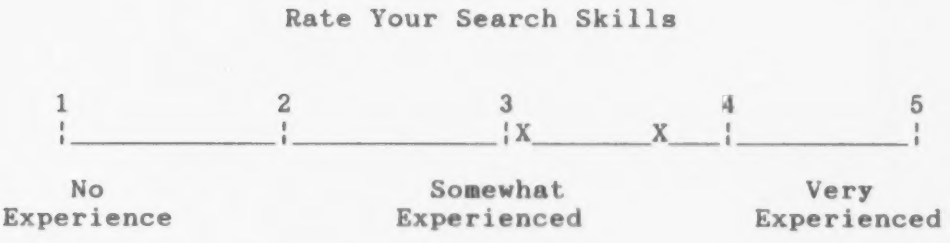
Table 3 shows that it appeared that students who explored the library on their own were less likely to believe that the materials they sought would be found in the university's library.

A T-Test was used to compare knowledge of search methods with students' attitudes about their search skills. It indicated that students who'd some training in learning how to use the library rated their search skills higher than those who stated that they'd had no training. (Table 4).

Table 4

T-Test Comparison of Students' Rating of Their Search Skills

Skills Course	Group	Mean
Yes	(Group 1)	3.7
No	(Group 2)	3.1



(26/79=32.9%) of all participants indicated dependence in the search process by stating that they'd had help from either a library staff member or someone else in order to locate materials for this particular search. A Chi Square test was used to make a comparison between independence and dependence and students' attitudes about the perceived difficulty of the search process. A significance was found at the .02 level between those who asked for assistance from library staff during the search process and those who found the search process to be difficult. Table 5 below shows the difference between independent and dependent searchers and their perception of difficulty with their searches:

Table 5

A Comparison of Perceived Search Difficulty Between Independent and Dependent Searchers

Independent Searchers									(N=79)
3	2	16	4	18	3	6	0	1	= 53
Dependent Searchers									
0	1	3	1	6	9	4	1	1	= 26
Extremely Easy				Neither Easy Nor Difficult				Extremely Difficult	

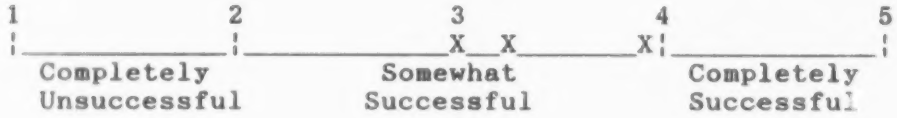
* P≤ .02

A second part of this research question looked at searchers' positive and negative attitudes when measured against success with locating materials. When measuring the percent of identified citations that students actually located against whether or not these students believed that their searches were successful, an Analysis of Variance was used. Results (Table 6) indicated that the greater the percentage of items located, the greater the student's feeling of success. When discussing this comparison, it is important to understand, however, that students were indicating only perceived item relevancy and not actual usefulness of items for their research papers.

Table 6

A Comparison of Searcher Attitudes: Success: and Percent of Citations Actually Located

(N=67)



% of Located Items	#	Mean
0-25%	11	3.0
26-50%	16	3.3
51-75%	22	3.9
76-100%	18	3.9

On a scale of 1 to 5, with 1 being *'completely unsuccessful'* and 5 being *'completely successful'*, a mean of 3.9 was noted for those students who located more than 50% of items from their list of identified relevant citations. However, out of the total of all participants who answered this question, only 6.3% believed that they had been completely successful with their searches.

3. What internal variables (cognitive strategies, searcher attitudes) do students who have conducted successful literature searches have in common?

For this question, two variables - strategies and attitudes - were measured against success. *Cognitive strategies* were defined as the search plans students stated that they usually used for a literature search. *Attitude* was looked at as participant satisfaction with the percent of relevant citations that were identified, and *success* was measured as percent of identified relevant citations obtained.

In measuring students' attitudes against success, it was apparent that those students who were the most satisfied with the amount of identified relevant citations were those who had managed to actually locate between 76-100% of the them, whereas those who managed to locate the least amount of identified relevant citations, 0-25%, were the students

who were the least satisfied with their searches. Table 7 shows this comparison of means:

Table 7
A Comparison of Searcher Attitudes and Search Success:
Satisfaction with Percent of Citations Located

Were you satisfied with the amount of citations Located?

(N=67)

% of Located Items	#	Mean
0-25%	11	2.5
26-50%	16	2.1
51-75%	22	2.0
76-100%	18	1.9

1 = very satisfied 2 = somewhat satisfied

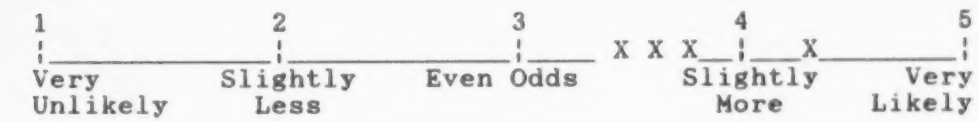
3 = somewhat dissatisfied 4 = very dissatisfied

For this same question, it was shown that the group who managed to locate the greatest percentage of perceived relevant items were also those who were the most likely to believe that the information they were seeking would be located at WSU's Purdy-Kresge Library. Table 8 illustrates this:

Table 8

A Comparison of Searcher Attitude with Search Success: Likelihood that Information is at Purdy-Kresge

(N=67)



% of Located Items	#	Mean
0-25%	11	3.5
26-50%	16	3.7
51-75%	22	3.6
76-100%	18	4.4

A comparison of strategies to success (in terms of satisfaction) showed that although the study's participants used a variety of strategies for their literature seaerches, no significant measures were obtained between participants' level of satisfaction with the percent of identified relevant citations, and what unique or common strategies or plans they developed to locate these citations.

4. What external variables (search experience, search methods, subject matter knowledge) do students who have conducted successful literature searchers have in common?

Generally, most study participants believed that they were fairly knowledgeable about the subject matter in which they would be searching. The following table (9) indicates level of subject matter knowledge for all participants:

Table 9
Subject Matter Knowledge: All Participants

(N=112)

Subject Matter Knowledge	#	Percent
Very familiar	22	19.6%
Somewhat familiar	50	44.7%
Very Unfamiliar	40	35.7%
Total	112	100.0%

When comparing independent searchers with level of success, there appeared to be some correlation between independent searchers and their attitudes about how successful they believed that they were with their searches. Students who were searching independently believed that they were more familiar with the subject matter of the search.

Pertaining to the relationship between search experience and success, in this study experience appears to be only indirectly related to success. Table 10 shows students' personal rating of their searching experiences:

Table 10

Rate Your Search Skills; All Participants

Search Experience	#	%
Little/None	26	23.2%
Some Experience	71	63.4%
Very Experienced	15	13.4%
Total	112	100.0%

However, when comparing experience to search success, 84.8% of all participants believed that they had been at least moderately successful with their literature searches.

A discussion of three distinct personality types was provided earlier in this chapter (page 58). Students who were referred to as the *Researcher* personality type believed that they were quite successful with their searches. When answering the question: *"On a scale of 1 to 5, with 1 being 'completely unsuccessful', and 5 being 'completely successful'"*, this group of subjects rated themselves the highest of the three types with a mean of 4, while those participants who were considered to be *Autonomous* searchers rated themselves the lowest of the three groups.

Secondary Research Questions

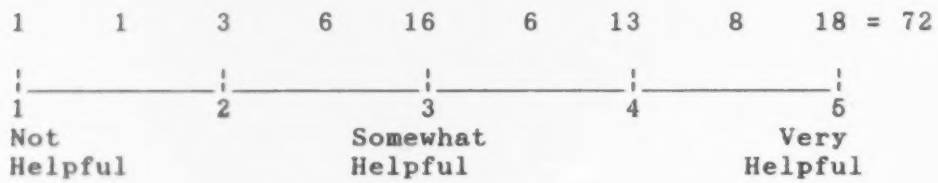
1. Are there some influencing factors, other than those encompassed in the primary research questions, involved in a successful literature search?

One influencing factor appears to be whether students acquired some type of either formal or informal search skills training prior to this study. The table below shows that most students who said that they had acquired some form of search skills instruction prior to this study agreed that the instruction had been at least somewhat helpful.

Table 11

Was Training Helpful?

For all respondents:



The mean for all respondents was 3.7, indicating that participants generally felt that whatever search skills training or instruction they'd had prior to this study, it had been somewhat helpful for this search. Only 6.9% believed that the training had not been helpful.

A second influencing factor seemed to be preparation time. An Analysis of Variance was used to compare planned search preparation time with a variety of other elements, both before and after students' searches were completed. Results indicated that those students who initially planned to spend the moderate range of time (1-3 hours) researching their questions were those who also believed that they'd had

the most success with their searches. This comparison showed a significant F at the .01 range. This group also (1) rated their search skills the highest with significance at the .04 level, (2) rated prior instruction the most beneficial, and (3) were the most satisfied with the amount of citations they were able to identify. In terms of whether or not this group believed that their searches were successful, a significant F was found at the .01 level. The following table compares the means for this group against the mean for all respondents on a variety of measures:

Table 12

Mean Comparison: Search Preparation Time

1-3 Hours

Questionnaire	Scale	Mean	All
(Pre)	Know Subject Area	3.0	2.6
(Pre)	Know Topic Area	2.6	2.2
(Pre)	Rate Search Skills	3.9	3.2
(Post)	Amount Satisfaction	1.5	2.1
(Post)	Search Success	4.1	3.6
(Post)	Training Helpful	4.0	3.8

2. Are there any differences, in terms of the problem solving process, between new graduate students and doctoral candidates in their abilities to complete successful literature searches?

When problem solving in order to locate relevant materials for their papers, there appeared to be no differences between the various levels of students (MA, Ph.D., Ed.D.), or how far they were in their programs ('new student' to 'Master's essay/doctoral candidate'). Subjects appeared to use whatever items they could locate, and in whatever manner was most convenient. There also seemed to be no order to the strategies they used for searching. Many students looked through LUIS first, while others first tried different databases and then went to LUIS. Some asked for help immediately, while others went through a number of other steps before asking for help. The success of participants' literature searches, and the manner in which they approached their searches appeared to be based upon a variety of other different variables, including search experience and subject matter knowledge, but not program level (i.e. MA, Specialist, Ed.D., Ph.D.).

3. **Is there any relationship between literature search strategies and educational level?**

Upon review of the Search Report Charts (Questionnaire #2), for all subjects in this study, it appeared that students who were researching materials for their Master's essays for Library and Information Science were much more sophisticated in their use of methods to narrow, broaden,

and/or combine search terms. The computer database of choice for this group of students was DIALOG, which is a subset of ERIC. As expected, the participants at this level in the LIS Program were the ones with the most search experience. This was the only discernible difference seen between educational level and search strategies.

4. If a novice end-user is unsuccessful in completing a literature search, to what does s/he attribute the problem?

Although most students stated on their questionnaires that ultimately their literature searches were successful, it may have been because they had obtained enough relevant items for the research papers that they were writing for this particular assignment. The questionnaires for this study asked no questions which would provide a measure of item usefulness, only item relevancy. Therefore, students' attitudes toward success were based upon whether they *thought* they had found enough with which to write a paper, but not on how many of those items they would ultimately be able to use.

Students made numerous comments to the researcher (which can be found in Appendix E of this document) about the problems that they encountered when attempting to complete this literature search.

When asked about past unsuccessful searches, the majority of respondents (74.1%) stated that they had generally been successful. However, when their past searches had been problematic, students attributed this to a variety of reasons:

Table 13

List of Reasons for Past Unsuccessful Searches

For the times that you were not successful in your search, check the one answer that best describes the reason.

Reason	#	%
Library was unfamiliar	6	5.4%
Lib Staff unhelpful	5	4.5%
Didn't ask for help	10	8.9%
Didn't use right source	8	7.1%
Unable to find citations	47	42.0%
Found cites-not useful	22	19.6%
Never used WSU lib sys	2	1.8%
Other reasons	6	5.4%
No past problems	6	5.4%
Total	112	100.0%

5. To what extent are graduate students utilizing all available library resources to locate information?

When study participants were asked on the Presearch Questionnaire to indicate what library resources they had used in past searches, 75% stated that they had used reference librarians, 96.4% had used journals, 91% had used

the library's books, and 82% had used computer databases. When asked whether they planned to use any alternative resources to complete this literature search, only 17% of the subjects indicated that they did not plan to use any additional resources other than what could be found in the library. Of the remaining 83% of students who planned to use other resources instead of, or in addition to the academic library, a variety of reasons were given: 43% believed that alternative resources would be easier to use or access, 10.7% stated that using other resources would help them to begin the research, and 36.6% stated that they would use alternative resources as a way to locate specialized items that they believed they could not find in the university's general library.

It became immediately clear that many of the library's resources were unfamiliar to the participants. Results from both the Search Report Chart and the Postsearch Questionnaire showed that most of the library's available resources were used by only a few of the participants. Such commonly known databases as PSYCHLIT, LEXIS-NEXIS, and ERIC were used even less frequently than this researcher had originally presupposed. LUIS (Library Users Information System), Wayne State University's holdings catalog, was used most frequently. 94.9% of the Postsearch Questionnaires indicated the use of LUIS. It appears that students were attempting to locate all of their sources via this one

database instead of using a variety. 87.4% did not use database thesauruses while searching, but for those 12.6% who did, the Library of Congress Subject Headings and ERIC were the most commonly used.

Students also went to other libraries and/or sources other than WSU's Purdy-Kresge in order to research their papers. On the **Presearch Questionnaire**, 15% stated that they planned to use a source other than the University's library, citing such alternatives as personal libraries, work libraries, and information from friends, colleagues and professors. On the **Postsearch Questionnaire**, however, 53% of all students who answered this question stated that they had in fact used a library other than Purdy-Kresge in order to complete their research.

Summary

This study indicated that there is a variety of information that we are just beginning to understand about graduate students' attitudes and skills with the literature seaerch process. However, there remains a great amount of information that has not yet been explored.

Measures of Experience - Students generally believed that they were experienced database searchers. However, very few of the library's database sources were familiar to, or were

used by this study's participants, either in past searches or for this assignment. As expected, the most experienced searchers were those participants who were writing Master's essays for their degrees from the Library and Information Science Program. Although they were the most sophisticated in their search methods, however, they did not necessarily use more library resources than any other student group.

Subject Matter Knowledge - Generally speaking, participants in this study believed that they were familiar with the topic and subject matter about which they were searching for literature. Some familiarity with subject matter seems to be connected to attitudes about success with searches.

Success - This was measured in a variety of ways, including level of satisfaction with the amount of citations identified, percent of identified citations actually located, and whether the student believed that s/he was successful with the literature search. Nearly all of the participants in this study believed that they had some amount of success at one level or another.

Attitudes - The different ways of measuring this included levels of satisfaction, percent of materials actually located, and whether having had some type of training in search skills was helpful. Students generally had positive attitudes about their search outcomes, but those who stated that they'd had some type of formal or informal training were the most likely of the participants to believe that

their searches had been successful.

Search behaviors - Subjects involved in this study displayed a variety of search behaviors. There was no information from this study which could point to methods of literature searching that were either (1) distinctly different or (2) common to the majority of participants.

Strategies - It appears from the discussion in this chapter that most of the participants in this study did not enter the literature search process with definitely developed search strategies. Although students identified their strategies on the Presearch Questionnaire, when it came time for the actual search process, strategies appeared to have developed as the searches progressed. The plans were not the same as the actual steps taken by participants.

Formulating a Research Question - For most of the participants involved in this study, there appeared to be a lack of understanding with the concepts of 'research question' and 'problem statement'. Many students had no idea about search terms or keywords, or what it meant to develop a search strategy. However, by the end of their searches, some of the students had developed reasonable research questions. Many more continued to lack any understanding of what constituted a problem statement.

Time - It was seen that a moderate amount of preparation time spent prior to the literature search was helpful and had a positive influence upon the participants in this

study. Those who spent 1-3 hours, as opposed to less or more time in preparation, were the ones who rated themselves highest with their success in searching, were the most satisfied with the amount of citations identified, and rated their search skills the highest.

When compiling and summarizing all of the aspects of this descriptive study, this researcher believes that the results show that students who were confident of their skills had the best attitudes about the literature search process, and that students' exposure to information literacy may be the best way to build this confidence.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Adults make up an ever increasing learner population on today's university campus. As the need for training for new types of jobs increases, as job demands change, and as many adults develop a greater interest in improving their skills, employability, and financial advantage in already held positions, enrollment in higher education is and will be growing for the forseeable future. Populations in graduate school programs are currently expanding at an even greater pace than undergraduate schools. This means that adult learners are becoming an ever increasing group of learners on college campuses. Further, online and print literature searches are being performed by most of these adult graduate novice end-users without the aid of formal training seminars or library staff, who are the traditional information providers. With information doubling at the current rate of every 18-20 months, and predicted to be every 70 days by the year 2010, information literacy and the ability to search are developing into increasingly important factors in the educational process. How successful and satisfied were these non professional searchers when it came to locating relevant and useful materials for research papers, master's

theses or dissertation literature reviews? What search behaviors and strategies were common or unique to this population? Can insructional designers learn ways to help academic librarians design unique instructional programs to meet the needs of a variety of learner populations?

This chapter will provide the reader with a summary of the study, interpretation and discussion of the findings, and conclusions drawn from these findings. It will also discuss (1) implications regarding practice and future research, (2) applications this project may have for other areas, and (3) some recommendations for future research.

Summary of the Study

This study took place at Wayne State University during the Spring, Summer, and Fall semesters of 1994. All participants in this research project were taking courses on the main campus of WSU during this time period.

Voluntary participants were selected primarily from the Library and Information Science and Instructional Technology programs. There were also some students who were majoring in other areas of education. The variety of graduate students who chose to participate in this project were at a combination of all levels of study in their respective programs. Of a total of 112 participants who began this study, 79 students completed it. All students were over the

age of 24, and all students were allowed to use any variety of materials and resources, on or off of the university campus, to complete their literature searches.

Students were informed that they could search on any topic as long as it was relevant to their individual research needs, which meant (1) a literature review for a master's thesis/essay/project or doctoral dissertation, or (2) a course assigned research paper. The two choices participants preferred for their literature searches were either a course assigned research paper, or a literature review for the master's essay.

Findings

For this researcher, the study identified several important issues regarding the need for instruction in information literacy:

(1) Knowledge of Database Searching

Generally, participants claimed not only that they were adept in methods of literature searching, but also that they were quite familiar with their subject matter area, as well as the topics about which they were conducting information searches. However, when asked, many of these same students indicated that they did not use, nor were they familiar with, most of the library's resources, and generally used

only a few broad based databases for their searches. Then, too, databases appeared to be used improperly or in a very narrow manner. k= (Keyword), s= (subject) were the most common ways to obtain citations. Other options were rarely explored, and methods such as truncation or the coupling of various word combinations were used only by a few of the most experienced study participants, although such directions for database use are clearly written out at each terminal, and also provided through an easy onscreen tutorial. Very few students acknowledged using the databases' tutorials.

This study has shown that although students stated that they were fairly pleased with the results of their searches, they did not use many of the available database thesauruses to locate appropriate search terminology prior to searching. Rather, the most common strategy, as stated by these participants, was simply to begin searching for items. The first step in the search process for 42 of the 79 participants who completed the Postsearch questionnaire was to look through the University's LUIS (Library User Information System) Catalog.

(2) Time

Generally, students misjudged the amount of time it took to do a thorough job of researching a topic. Results taken from the Search Report Chart indicated that many students (1) wasted a lot of time by not using the database

thesaurus to narrow their search terms, or (2) asked for help from staff only after unsuccessful use of other options. Participants were searching with inappropriate terms that either returned nothing or too many hits because their terms were incorrect or too broad. Rare were the students who used any sophisticated techniques.

(3) Attitudes

Many students stated that they could not locate the relevant materials after identifying them. Instead of asking for help from library staff at that point, participants told this researcher that they used only what they could locate from their lists of relevant citations. Students blamed their inability to locate their identified items on the library's lack of resources. However, when pressed further by this researcher to discuss this problem, many of the students stated that they had not tried Interlibrary Loan or any of the other available resources or methods to locate needed items. The Appendix section contains a list of the variety of comments made to the researcher upon completion of the Postsearch Questionnaire.

(4) Search Success

As stated previously in this paper, search success was determined by subjects' stated satisfaction with their searches, personal considerations of success, and time taken to go through the process. As discussed in Chapter IV, students generally felt successful with their searches, but

agreed that prior training would have been helpful.

Interpretation and Discussion of Findings

With the understanding that the results of this study are unique to the location, subject population, and type of research completed by each participant, this research indicates the following:

Users of Library Resources

Adult urban university students, perhaps because they do not live on campus, and in order to avoid making trips to the campus unless they are attending classes, can be quite creative in locating a variety of resources from off campus locations not affiliated with Wayne State University. Public, personal, and work libraries were especially popular choices. A few students, who resided near other major universities, chose to do their research there.

Resource Selection

Participants in this study used very few of the great variety of Wayne State University's library resources available to them. Although many participants stated that they were knowledgeable about subject matter in their fields of study, they tended to use a very limited selection of general resources and materials in order to attempt to locate new information.

Databases

As indicated by the participants' preference for computer over print databases, there appeared to be no fear of computer searching in this study. However, generally students used only a few computer databases for their searches. Except for Library and Information Science Program students who were working on their master's thesis proposals, few other participants were familiar with the wide variety of available databases, and only a few students used any print sources for their searches.

Problem Statements and Search Terms

Students did not appear to go into their searches with an understanding of the need for a well defined problem statement or narrow enough search terms. Results of this study indicated that students were not initially organized, and were unaware of the concept of a search or problem statement. A review of the students' search statements, their lists of keywords or search terms, and their lack of a problem statement on the Presearch Questionnaire showed that generally students did not begin their research assignments with an understanding of the literature search process. A review of the Postsearch questionnaires, however, indicated that many participants had, by that time, vaguely developed search questions, but there remained a lack of understanding of the "problem statement" concept. The Appendix section of this document contains a list of

"problem Statements" students wrote on their questionnaires.

Implications

By examining the cognitive strategies and search behaviors of adult graduate students as novice end-users of academic literature, the implications for instructional design practice and research point to a need to focus instructional design theory and practice toward the college campus. Implications from this study can be seen in terms of both practice and research.

Practice

Findings from this study suggests that one focus for future practice should be with the greater development of instructional design for academic librarians. The field of higher education, and indeed, education as a whole, is slow to acknowledge the importance of instructional designers as educators. Review of the literature completed for this study has shown us that the education of information users on the college campus is becoming increasingly more important as greater numbers of students must interact with increasing sources of information as well as information science's ever advancing technologies. Sound instructionally designed information literacy courses, which take into account the end-user's understanding of the entire process of research and information access, is a step in a necessary

direction for graduate students who are just entering their programs of study. The findings from this study suggest that students who have had some training in literature search skills feel more successful about their own searching skills as well as the literature searches that they independently perform.

Instructional designers should be able to help library staff design information literacy courses which include: (1) students' understanding of what information is available for their own unique programs, (2) understand how to develop a problem statement, (3) how and with what tools to access the information, (4) determine item relevancy, and (5) integrate the material into their own research.

Research

In shifting the focus of instructional design research toward the college campus, one can also look at improving the design of those systems which provide information access to novice end-users. This study points toward the need for further research in the entire area of information access from a database user's perspective. As instructional designers we should be asking ourselves how we can help information systems designers to improve their users' abilities to access the information within those systems? And although these information systems are becoming increasingly easier to operate, what more can we do to help literature searchers locate relevant and useful materials

for their research needs?

Recommendations

Wayne State University provides a course in bibliographic instruction (i.e. information literacy) for incoming undergraduate students. Results of this study suggest that (1) graduate students appear to be unaware of such a course, and (2) graduate students are also in need of instruction in information literacy when they first enter their programs. Because information and its sources continue to increase exponentially, developing information seeking skills is and will continue to be of much greater importance than learning how to use any one piece of hardware or software. Therefore, now and in the future, instructional designers and library educators must place a greater value upon the design of instruction which will fit end-users' needs. This type of course could be designed to familiarize graduate students with the library system's available resources and materials. An information literacy course, which is designed to be unique to each graduate program, could also help students by allowing them to develop skills which would point them in the correct direction to successfully locate various materials as well as current research in their own programs.

(3) Wayne State University is situated in an urban

environment. The average age of its student population is 28.6 years, with only 12% of the total student population residing on campus. Adult students lead active lives away from the university setting. Coursework is only one small part of an adult student's life, but it consumes a great amount of time. Not all students are knowledgeable about methods of distance access to the library system's information, which could cut the time problem considerably. It is this researcher's opinion that WSU should, therefore, provide students with access to the university's materials and resources from numerous locations in the metropolitan area. Urban universities should make a greater attempt to provide easier access to information for all of its students. If students do not have such access to the university's library system in their own homes (i.e. via modem, etc), a tie-in to the library system's resources and materials with instruction for effective use should be available from many more convenient, centralized sites than are currently available. This access would also help students in the College of Lifelong Learning who, as off campus students, rarely have a need to go to the main campus for classroom instruction.

(4) Academic librarians, who have suspected for a long time that students avoid asking library staff for help, need to become more 'user friendly'. This researcher sees a unique opportunity for a joint effort between the university's

Library and Information Science and Instructional Technology programs as a step in that direction. Instruction in information literacy, jointly developed by both programs, provided for all students in every one of WSU's graduate programs, and taught by the librarians who are assigned to those particular academic areas of study, could not only help both students and librarians, but also further prove how the use of instructional design has relevance and importance in all academic areas.

Recommendations for Further Research

The following is a list and brief discussion of suggestions for conducting further research on this topic.

(1) Broader sample population:

The majority of the individuals participating in this study were from two programs: Instructional Technology and Library and Information Science. Because students in these two programs came from a variety of work and educational environments, including education, business, industry, and allied and health care services, this researcher believed that they would be ideal participants for a limited study. Further research on cognitive strategies and search behaviors of adult students should include participants from a greater cross section of a university's graduate programs.

(2) Broader areas of interests for student research:

All student participants were given their choices regarding the type of information for which they wanted to search. However, in allowing these choices, no student attempted to use this opportunity for a dissertation literature review search. Further research on this topic should consider participants who would be willing to complete a dissertation literature review in order to see if students with this type of need for information utilize more or different resources, or have a better understanding of the development of a problem statement than what was found in this study.

(3) Search Restrictions:

Participants were not restricted in their literature searching to the use of materials and resources located in Wayne State University's Purdy-Kresge Library because it was more realistic to allow adult urban university students to conduct their searches where they believed access to information was most convenient for them. Further study could look at searches in which restrictions were placed upon participants' use of a single academic library or university library system to see whether search techniques and/or behaviors would in any way be altered.

(4) Research on library use in the broader community

How one conducts an information search also has implications outside of the arena of higher education.

Other individuals may be utilizing many of the same strategies and behaviors when conducting information searches for their own or employer's unique information needs. Observation of search behaviors and strategies used by adult novice end-users in the greater population, who are using public, personal, and/or special library materials and resources could help in the design of instruction of information literacy for all novice end-users.

This study has shown that there are a variety of variables involved in a successful literature search. Sound and thorough research depends upon the acquisition of relevant and useful information. This study sought to understand how a variety of different elements make an impact upon the literature search process. Further research on this topic could add to our understanding of what types of instruction adult learners in higher education may require in order to gather sufficient materials to suit their research needs.

APPENDIX A

HIC FORM LETTER

INFORMATION RETRIEVAL TECHNIQUES: THE DIFFERENCES IN COGNITIVE STRATEGIES AND SEARCH BEHAVIORS OF GRADUATE STUDENTS IN AN ACADEMIC LIBRARY

Charlotte E. Simon, #577-1728
College of Education (IT)

Dear Graduate Student,

This is a descriptive study which will be examining the variety of methods employed by Wayne State University graduate students when they use an academic library to search for relevant materials for a research paper, master's thesis/project, or dissertation. It is designed to analyze students' search strategies and behaviors, in order to better understand students' research needs in an ever expanding information environment. Results of this study should indicate how the WSU Library System is currently being used by a variety of university students.

We are requesting your voluntary participation in this anonymous three part study, which will include Presearch, Search, and Postsearch questionnaires. To maintain subject confidentiality, please do not write your name on the questionnaires, and note that all answers will be seen only by the researcher. No penalty would be involved should you refuse to participate in this study, and you can refuse to answer any questions without explanation. This questionnaire should take approximately 20 minutes to complete, and we will be available to answer any questions you may have. Thank you for your time and participation in this study.

In the unlikely event of any injury resulting from this research study, no reimbursement, compensation, or free medical care is offered by Wayne State University.

Questions: If you have any questions concerning your participation in this study, now or in the future, or if you have any questions regarding your rights as a research subject, Dr. M.J. Lefford can be contacted at #577-1628.

Consent to participate in this research study: I have read or had read to me all the above information about this research study. The content and meaning of this information has been explained and is understood. I hereby consent to voluntarily participate in this study. I will receive a signed copy of this consent form.

Subject's Signature _____ Date _____

Investigator _____ Date _____

APPENDIX B

PRESEARCH QUESTIONNAIRE

I. Presearch Questionnaire

Prior to conducting your information search, we would like to understand some things about you and your library search habits and experiences. Please answer the following questions to the best of your knowledge.

I. Personal Information

The following section will provide us with some background information for our study:

I.1 Age: ___ I.2 Gender: __ Male __ Female

I.3 When did you complete your undergraduate studies?

__ In the last year __ 2-5 years ago
__ 6-10 years ago __ More than 10 years ago

I.4 Did you complete your undergraduate degree at WSU?

__ Yes *(.4a)* __ No *(.4c)*

.4a If '*yes*', did you get any formal introduction to WSU's library systems and/or services (i.e. class, seminar)

__ Yes *(.4b)* __ No *(1.5)*

.4b If '*yes*', explain _____

.4c If you did <u>not</u> complete your undergraduate degree at WSU, did you take any library introduction or search course at the university or college you attended? __ Yes __ No

I.5 What is your current graduate program or school?

__ Business Adm __ Education __ Engineering
__ Fine Arts __ Library Science __ Liberal Arts
__ Lifelong Learning __ Nursing/Allied Health
__ Science __ Urban, Labor & Metro Affairs
__ Other. Explain _____

.5a Which one of the following statements best describes how far along you are in your program?

__ New Student to my program (11 or less hours completed)
__ 12-20 class hours completed toward my degree
__ 21 or more class hours completed toward my degree
__ Working on Master's essay/thesis/project
__ Doctoral Candidate (written and oral exam completed)

.5b Please indicate your current level of study:

__ Master __ Specialist __ Ph.D/Ed.D

I.6 Which one of the following statements best describes your reason for performing this literature search?

__ Course assigned research paper __ Master Thesis/Essay/Project
__ Dissertation Literature Review
__ Other. Explain _____

.6a If this literature search will be for a course assignment, what will be the paper's approximate page length?

__ 3-5 __ 6-10 __ 11-15 __ 16+ __ Undetermined

II. Subject Matter Knowledge

This section will tell us what you know about the subject matter about which you intend to find literature.

II.1 Please tell us something about the discipline area for which you are interested in finding literature.

This area is my: __ Major __ Minor (MA) __ Cognate (Ph.D/Ed.D)

II.2 On a scale of 1 to 5, with 1 being 'not familiar', and 5 being 'expert', tell us your level of knowledge in the *subject area* in which you will be searching.

1	2	3	4	5
Not Familiar With Subject		Somewhat Familiar		Subject Expert

II.3 On a scale of 1 to 5, with 1 being 'little / 'nothing', and 5 being 'expert', how much do you believe you know about the *topic* on which you will be searching?

1	2	3	4	5
Little		Familiar		Expert

II.4 On a scale of 1 to 5, with 1 being 'very unlikely',and 5 being 'very likely', how likely is it that WSU's library system will have the literature for which you are searching?

1	2	3	4	5
Very Unlikely	Slightly Less Likely	Even Odds	Slightly More Likely	Very Likely

III. Search Experience

This section will help us understand what you already know about searching for literature in the library.

III.1 Will this be your first trip to the Purdy-Kresge Library this term?

__ Yes __ No

III.2 How often do you estimate that you use the library's resources?

__ Several times each week
__ Several times each month
__ Several times per term
__ I've never used the WSU Library System

III.3 How did you first learn to use an academic library?
(Check the one answer that best fits)

__ Explored on my own
__ Help from a librarian/staff
__ Handbook or other print source
__ Seminar given by library
__ Help from friend/classmate
__ I've never used one

III.4 On a scale of 1 to 5, with 1 being 'no experience', and 5 being 'very experienced', how would you rate yourself in computer database searching?

1	2	3	4	5
No Experience		Somewhat Experienced		Very Experienced

III.5 Which of the following computer databases do you use?

(Please check each item)	Not Familiar	Few Times	Use Most Often
ABI/INFORM	___	___	___
LUIS EXPRESS	___	___	___
LUIS PLUS	___	___	___
ERIC	___	___	___
INFOTRAC EF	___	___	___
DISSERTATION ABSTRACTS	___	___	___
Sociofile	___	___	___
MLA INTERNAT'NAL BIB	___	___	___
PSYCHLIT	___	___	___
EconLIT	___	___	___
National Newspaper Index	___	___	___
Social Work Abstracts PLUS	___	___	___
Government Publications	___	___	___
LEXIS/NEXIS	___	___	___
GOPHER/Internet	___	___	___

IV. Search Strategies

Everyone uses a different strategy to search for materials. We would like to know what strategies you use to perform your searches.

IV.1 Do you plan to use a modem to search on-line instead of traveling to the library to begin your search? __ Yes __ No

IV.2 Assuming that you have already selected a topic, circle the number next to the following that best describes your usual procedure when searching for *new* materials.

1 Ask for help -> Choose Search Source -> Consider Search Terms ->
-> Search/Identify Citations -> Locate Items -> Determine Relevancy

2 Subject Encyclopedia -> Choose Search Source -> Use Thesaurus ->
-> Search/Identify Citations -> Locate Items -> Determine Relevancy

3 Choose Search Source -> Search/Identify Citations -> Locate Items->
-> Determine Relevancy

4 Choose Search Source -> Take Tutorial -> Use Thesaurus ->
-> Search/Identify Citations -> Locate Items -> Determine Relevancy

5 Other. Explain _____

_____

_____

IV.3 Check each of the library's resources that you use.

__ Reference Librarians __ Journals __ Books
__ Media Library __ Computerized Databases
__ Newspapers __ Inter Library Loan
__ Print Indexes __ INFOPASS
__ Other _____

IV.4 With whom do you usually search for materials?
(Check the one answer that best fits)

__ Independently __ With a librarian/staff __ Friend/classmate
__ No prior search experience in an academic library *(IV.6)*

IV.5 Do you believe that you have been successful with past literature searches?

Generally	Sometime successful	Usually not
__ Successful	__ Sometimes not	__ Successful

.5a For the times that you were ***not*** successful in your searching, check the one answer that best describes the reason.

__ Was unfamiliar with library
__ Librarian/staff was not helpful for my problem
__ Did not ask for help
__ Did not use correct indexing service or database
__ Could not locate items once citations were identified
__ Located items, but decided they weren't useful
__ Have never used the WSU library system before now
__ Other. Explain _____

IV.6 What alternative materials/resources, other than what is found in the library, do you plan to use in your research? ***(Check all that apply)***

__ Personal Library __ Work Library __ Professor/Advisor
__ Personal Experience __ Information from a friend/colleague
__ Other. Explain_____
__ Do not plan to use alternative resources for this search *(IV.7)*

.6a If you checked any reasons above (IV.6), which one statement best describes *why* you plan to use alternative resources?

__ Easier to use __ Easier to access
__ Help to begin __ Specialized information

.6b Which one of the following best describes *how* you plan to use these alternative resources?

__ Narrow my topic
__ Supplement research
__ As guidelines
__ Broaden my topic
__ Integrate with research
__ Substitute for library search

IV.7 Do you prefer using print (i.e. CIJE, Social Science Index, etc.) or computerized database (i.e. ERIC, LUIS, PsychLit, etc) sources when you search for materials?

__ Print __ Computerized Databases __ Either is okay

IV.8 Do you use a print or database thesaurus to identify search terms?

__Never __ Occasionally __ Usually/always

IV.9 When you have located the identified items, what method(s) do you usually use to decide whether or not these items will be relevant to your research question? ***(Check all that apply)***

By: __ Author __ Title __ Citation __ Abstract
__ Reading the entire item __ Skimming the item
__ Skimming the Table of Contents __ Skimming the Index

V. Time

We always try to anticipate the approximate amount of time any project will take us.

V.1 Approximately how much time do you plan to spend researching this question that you proposed?

__ Less than 1 hour __ 1-3 hours __ 4-6 hours
__ 1 or more days (8+ hours) __ No Idea

V.2 Which one statement best describes what you think will take up most of your search time?

__ Defining research topic
__ Determining appropriate search sources
__ Waiting to use the search sources:
__ Print __ Computer __ Getting on-line
__ Identifying search terms
__ Identifying titles/citations/abstracts
__ Locating the identified items
__ Determining whether located items are relevant
__ Recording the located material (notetaking or photocopying)

V.3 Approximately what percent of the time do you find what you need when you are searching for information?

__ 0-20% __ 21-40% __ 41-60% __ 61-80% __ 81-100%

VI. Formulating the Search Question

Before performing any literature search, it is best to have some idea about the topic and key words/search terms

VI.1 Please state the title and/or topic of your research question:

_____

_____

_____

_____

_____

VI.2 What do you believe some of the keywords/search terms are for this research question?

_____ _____

_____ _____

_____ _____

VI.3 Please provide, if you can, a problem statement for this research question.

_____

_____

_____

_____

_____

_____

_____

APPENDIX C

SEARCH REPORT CHART

II. Search Report Chart

ID#[_ _ _]

This chart is to be used whenever you are searching for items pertaining to your search question. Please refer to back for a definition of terms.

Search Tool	Search Term	#Items Retrieved	#Items Relevant	Determined By	Time Spent

DEFINITION OF TERMS

1. Search Tool:
   What was used to look up titles, authors, citations, or abstracts. Examples include: ERIC, Information Science Abstracts, RIE, CIJE, Current Contents, LUIS,

2. Search Term:
   Word or phrase used when looking for information on a topic. Examples include: Mental handicap, cognition, computer based instruction, graduate students, academic libraries, etc.

3. # Retrieved:
   The number of items (titles/citations/abstracts) were found on the database or in the print source for that search term (word/phrase).

4. # Relevant:
   The number of the items found for that term which *appear* to be relevant to your research question.

5. Determined By:
   By what means (i.e. reading the abstract, title, citation, etc) did you decide upon the usefulness of the items.

6. Time Spent:
   The amount of time it took to go through the entire process for each database or print source for that particular search term.

APPENDIX D

POSTSEARCH QUESTIONNAIRE

ID# [_ _ _]

III. Postsearch Questionnaire

Dear Graduate Student,

Now that you have gone through a process of searching for materials on the research question posed by you at the start of this project, we would like to know about your literature search experiences and attitudes. Therefore, we are asking you to please take some time to complete the attached questionnaire.

Please accept our sincere thanks for taking the time to be an important part of this project.

Charlotte E. Simon
Wayne State Uiversity
College of Education (IT)

I. Search Strategies

Each individual uses unique strategies in order to obtain information for locating needed materials. We would like to know something about the way *your* literature search took place.

I.1 Please place your search steps in numerical order. Place a '1' by your first step, a '2' by your next step, etc. *Do not* place numbers beside steps that you did not use.

__ Asked for help from librarian
__ Asked for help from friend/colleague
__ Looked up topic in a specified subject encyclopedia
__ Completed a tutorial of the database you wished to search
__ Searched for items on LUIS EXPRESS
__ Searched for items on LUIS PLUS
__ Searched the thesaurus of specific database/print index
__ Searched a print index (i.e. CIJE, Library Lit, etc.)
__ Searched a computer database (i.e. ERIC, GOPHER, etc.)
__ Located books/articles from a class reference list
__ Used a source(s) other than a library
__ Used a library other than Purdy-Kresge
__ Other - Explain_____

1.2 If you used any thesaurus(es), which did you use?

__ ERIC descriptors
__ Sociological Indexing Terms
__ Search INFORM
__ No thesaurus used for this search
__ L C Subject Headings
__ Psychological Indexing Terms
__ Other. Name _____

.2a If you used any encyclopedia(s), which did you use?

_____

I.3 Check each of the library's resources that you used.

__ Reference Librarians
__ Media Library
__ Computerized Databases
__ InterLibrary Loan
__ Newspapers
__ Journals
__ Books
__ Print Index/Abstracts
__ INFOPASS
__ Other _____

I.4 Check the one answer which best describes how your search for items was accomplished?

__ Independently in the library
__ With a friend/colleague
__ Modem (home/office)
__ By library staff
__ By a friend/colleague
__ Other _____

I.5 Did you identify enough items for your topic on your first try?

__ Yes *(1.7)* __ No *(Answer the following)*

I.6 If you did *not* identify what you thought were enough items, which one of the following best states the plan you tried next?

__ Went from print index to computer database
__ Went from computer database to print index
__ Went to a different type of computer database
__ Went to a different type of print source
__ Other _____

I.7 Check the one best answer which describes the decision you made about your research question after your initial search for information.

__ Kept the question and keywords that I'd already developed
__ Broadened only the terms __ Broadened the question
__ Narrowed only the terms __ Narrowed the question
__ Changed only the terms __ Changed the whole question

I.8 Were you satisfied with the amount of citations identified?

__ Very Satisfied __ Somewhat Satisfied __ Somewhat Dissatisfied __ Very Dissatisfied

II. Locating Materials

Once you have identified the items that you wish to use in your research paper, you need to locate them.

II.1 Check all of the places where you located the identified items.

__ Reference Desk __ Reference Section (bound or current journals)
__ Stacks (books) __ Media Library
__ Newspapers on File __ InterLibrary Loan
__ Other _____
__ Unable to locate any information for this research topic at the Purdy-Kresge Library. *(Answer the following)*

.1a If you were unable (or did not go) to Purdy-Kresge to locate items, what did you use as an alternative to complete your search? Explain:

_____

_____

II.2 From your list of identified titles, what percent of those titles were you actually able to locate?

__ 0-20% __ 21-40% __ 41-60% __ 61-80% __ 81-100%

II.3 Now that you have determined which items are relevant, how do you plan to utilize them for your research? *(Check all that apply)*

__ Use their reference lists to find other citations
__ Use their reference lists to find other writers
__ Cite portions of item(s) in my paper
__ Read them to get more information on the subject
__ Don't know yet, but know they are relevant to my topic
__ Did not identify any relevant items for my research topic
__ Other Explain _____

III. **Time**

Approximately how much time did you spend on the following:

III.1 Preparing to search *computer databases* (looking up terms, considering ideas in the search question, etc.)?

__ 0-10 minutes __ 11-20 minutes __ 21-30 minutes
__ 30-45 minutes __ 46-60 minutes __ More than 1 hour

III.2 Preparing to search in *print indexes* (looking up terms, considering ideas in the search question, etc)?

__ 0-10 minutes __ 11-20 minutes __ 21-30 minutes
__ 30-45 minutes __ 46-60 minutes __ More than 1 hour

III.3 Searching on *computer databases* for this research question?

__ Less than 1 hour __ 1-3 hours __ 4-6 hours
__ 1-5 days __ 1 week __ More than 1 week

III.4 Searching in *print indexes* for this research question?

__ Less than 1 hour __ 1-3 hours __ 4-6 hours
__ 1-5 days __ 1 week __ More than 1 week

III.5 Locating all of the identified items found in your search?

__ Less than 1 hour __ 1-3 hours __ 4-6 hours
__ 1-5 days __ 1 week __ More than 1 week

III.6 Once located, approximately how much time, on the average, did you spend determining the relevancy of <u>each</u> item?

__ 0-15 minutes __ 16-30 minutes __ 31-60 minutes

III.7 Have you completed your search? __ Yes __ No *(.7a)*

.7a If '*no*' approximately how much more time do you think you will spend researching this topic?

__ Less than 1 hour __ 1-3 hours __ 4-6 hours
__ 1-5 days __ 1 week or more __ Unknown

III.8 For this search, which <u>one</u> statement best describes what you believe took up most of your time?

__ Preparing to search
__ Locating the correct search sources
__ Waiting to use the selected search sources
__ Identifying titles/authors/citations/abstracts
__ Locating the identified items from your list
__ Locating alternative sources of information
__ Determining relevancy of all located items
__ Recording/photocopying the relevant items
__ Other Explain_____

IV. <u>The Search Process</u>

We would like to know what you think about your literature search process and involvement in this project.

IV.1 On a scale of 1 to 5, with 1 being '***extremely easy***' and 5 being '***extremely difficult***', how did you find the entire search process to be?

1	2	3	4	5
Extremely Easy		Neither Easy Nor Difficult		Extremely Difficult

IV.2 If you used <u>both</u> print and computer databases to search for items, which did you prefer?

__ Print __ Computer __ Both were OK

IV.3 Did you have any difficulty using any print indexes?

__ Yes *(.3a)* __ No __ Did not use

.3a If '*yes*' which one of the following statements best describes your difficulty?

__ The print indexes were too confusing/complicated
__ Found too many items to read through and identify
__ Unable to identify enough citations for my research
__ May have used wrong print index
__ Other Explain _____

IV.4 Did you have difficulty using any computer databases?

__ Yes *(.4a)* __ No __ Did not use

IV.4a If '*yes*' which one of the following statements best describes your difficulty?

__ The computer databases were too confusing/complicated
__ Found too many items to read through and identify
__ Unable to identify enough citations for my research
__ May have used wrong computer database
__ Other Explain_____

IV.5 If you have searched previously for information on this topic, approximately what percent of the items identified during this search were ones you had already identified?

__ 0-25% __ 26-50% __ 51-75% __ 76-100%

IV.6 Once you identified a list of citations from your print and/or computer search, approximately what percent did you actually locate?

__ 0-25% __ 26-50% __ 51-75% __ 76-100%

.6a Approximately what percent of these located items do you believe that you will use for your research paper?

__ 0-25% __ 26-50% __ 51-75% __ 76-100%

IV.7 On a scale of 1 to 5, with 1 being *'completely unsuccessful'* and 5 being *'completely successful'* how do you think your search turned out?

1	2	3	4	5
Completely Unsuccessful		Somewhat Successful		Completely Successful

IV.8 Do you believe that the experience gained from this project could be useful for you with future literature searches? __ Yes __ No

IV.9 If you had some training prior to this project, rate it on a scale of 1 to 5, with 1 being *'Not helpful'*, and 5 being *'Very helpful'*.

1 2 3 4 5

|_____|_____|_____|_____|_____|_____|_____|_____|
Not helpful Somewhat Helpful Very Helpful

IV.10 If you have ***not*** had some prior search training, do you feel some training before your involvement in this project would have helped you?

__ Yes __ No __ Had some training

V. The Research Question

V.1 Please provide the title and briefly discuss your research question/topic.

_____

_____

_____

_____

_____

_____

_____

V.2 What are some of the key words/search terms you used for this research question/topic?

_____ _____ _____

_____ _____ _____

V.3 Please describe what you believe to be the problem statement for this research question.

_____

_____

_____

_____

APPENDIX E

STUDENT COMMENTS

I. STUDENT COMMENTS (SPOKEN)

NOTE: This appendix contains two sections. Section I is a list of the most commonly spoken comments gathered from students upon completion of their searches. Section II is a list of comments that students wrote on their questionnaires.

"I did this search with some idea of keywords and then I read things that I found [abstracts] for new keywords - a stumbling approach that worked. I have used databases for a while, and I am lazy and don't use resources for subject/keyword suggestions"

"My major problem is finding journals once I have located the abstracts of articles I want to use. If they are not on the shelf, I go to another library"

"I went to another library and found 10 out of 15 articles. WSU has only 1 of these articles that I was looking for."

"I think my problem is not the searching of databases, but the locating of articles in the library."

"I think my graduate program needs an introduction to the library course so that I can find what I'm looking for."

"I don't have time to use the library here on campus, so I use my neighborhood public library if I want to find something. It takes too long to find something at school, and people behind the desk don't know what I'm looking for."

"Even though I am a teacher and a graduate student, before this project the only thing I ever used was ***Reader's Guide***. Before, I didn't know what those other books were for, and I really don't like to use computers. I'm amazed at what you can find now."

"After going through the computer database for this assignment, and becoming frustrated, I began browsing through journals for another assignment. I was just lucky to accidentally spot an entire issue of a journal for this assignment. It was something that I couldn't find by looking through the computer."

"I couldn't find anything, so I took books off of the shelves and read the contents for relevant information."

II. STUDENT COMMENTS (WRITTEN)

A total of 79 Postsearch questionnaires were returned. On this third questionnaire, students were asked to discuss their problem statements. 33 participants left this section blank or wrote "N/A". 46 respondents filled in this section. Of those who did, 34 had developed an andequate statement or question that they had attempted to answer. However, other respondents replaced the problem statement with the following comments:

"I haven't a clue."

"My statement is probably too general."

"A lack of articles regarding [this topic]."

"Not enough information on this topic to say."

"[The problem is] Finding relevant articles."

"I'm not too sure what that means. Where did I have trouble in my research?"

"No, I had no problem."

"I'm very sorry I do not remember."

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ABSTRACT

INFORMATION RETRIEVAL TECHNIQUES: THE DIFFERENCES IN COGNITIVE STRATEGIES AND SEARCH BEHAVIORS AMONG GRADUATE STUDENTS IN AN ACADEMIC LIBRARY

by

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MAY, 1995

Advisor: Dr. John W. Childs

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Degree: Doctor of Philosophy

Descriptive study questioned why some graduate students appear to have few problems with literature searching, while others find the task difficult and are dissatisfied with their search experiences and the results. By using presearch, search, and postsearch questionnaires, the researcher examined various literature search strategies and behaviors of a cross section of 112 adult learners in graduate school who were the most likely candidates to use the materials and resources of a university's general library. Participants were at least 24 years of age, at all levels of study, and working toward their Masters, Specialist, or doctoral degrees. Students were enrolled in six on-campus courses of several graduate programs at Wayne State University during the Spring, Summer, and Fall, 1994 semesters.

Questionnaires addressed students' prior search experiences, search methods, search times, and attitudes, as

well as students' use of the available technologies, tools, and resources in order to complete their literature searches. Nine research questions were posed. Results of statistical analyses using Chi Square and ANOVA, as well as Frequency Tables indicated that generally students believed that they were successful in finding relevant materials for their research papers, but no search strategy appeared to be better than another, very few of the library's available resources were used, few students understood what constituted a problem statement or research question, and search skills were poorly developed. Students who had taken any type of formal or informal search skills instruction prior to graduate school believed that it had been quite helpful.

Several recommendations were posed, including a joint effort between the Instructional Technology and Library and Information Science programs in the development of search skills courses which would be unique to each of the university's graduate programs.

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